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SUMMARY OF THE MASTER PLANNING PROCESS

The Carvers Creek State Park Master Plan is a long-term approach to natural resource protection, development of recreational opportunities, and park facilities. The plan is based on a thorough study of existing natural, cultural and historic resources, a recreational needs assessment, actual site conditions and development constraints. Input and guidance from the public and the N.C. Division of Parks and Recreation was incorporated into the Master Plan in order to identify the appropriate facilities for the park. This long term master plan will continue to evolve over time, as new land is acquired and more information is collected about the available natural and man made resources in the study area.

Cypress Gums in the millpond

Susan Hatchell Landscape Architecture, PLLC led a team of consultants to prepare the master plan for Carvers Creek State Park. Ellen Cassilly Architect, Inc. provided architectural services, and Corley Redfoot Zack, Inc. provided engineering services for the project. The team performed an extensive site investigation and inventory to determine opportunities and constraints for park development. The team also gathered information about existing planning and recreation efforts already in place locally and regionally to determine the potential for improved connectivity. An architectural assessment of historic buildings located on Long Valley Farm was performed to determine the feasibility of building preservation and reuse for historical interpretation and park buildings. The team then worked with the N.C. Division of Parks and Recreation staff to develop a program.

A public input meeting was held in August 2010 to present the project background and three park Master Plan concepts. The concepts represented potential intensity levels of park development, from low intensity to high intensity. Meeting attendees and members of the public were invited to respond to a online survey that helped the consultants and N.C. Division of Parks and Recreation staff to create the Draft Park Master Plan.

The Carvers Creek Master Plan is based on an extensive review of available information and field work to determine the appropriate level of park development and natural resource protection. Detailed geotechnical, topographic, soil, architectural, ecological and hydrologic studies will be needed as park development progresses in order to ensure accurate and feasible park construction. Cost estimates and phasing opportunities for park development will also evolve over time based on economic conditions, available funds, and economy of scale. Due to these factors, the actual park facility priorities may change over time to reflect on-site limitations and cost constraints.

1 SITE CONTEXT AND HISTORY

Introduction

The Carvers Creek State Park study area is located in the Sandhills region of the state. The Sandhills region is known for its rich cultural history as well as an biologically diverse ecosystem. The North Carolina State Parks system has identified three specific properties within the study area for Carvers Creek State Park, and more land is under negotiation or investigation for purchase.

Systemwide Plan for State Parks and New Parks for the New Century

The Systemwide Plan for North Carolina State Parks, which established a framework and plan for improvement of the system, was updated in 2009. Based on the 1987 State Parks Act, the Systemwide Plan evaluated the current resources of the system, identified duplications and deficiencies, provided recommendations, and explained the trends in visitor use and impacts. The State Parks Act mandates that the N.C. Division of Parks and Recreation conserve representative examples of the diversity of North Carolina's natural resources and make those natural areas available to the public for recreation and environmental education. See Appendix A for the 1987 State Parks Act. As North Carolina's population continues to grow, the demand for outdoor recreation continues to increase as well. See Figure 1.1 for the park's location in the state.

Longleaf pine forest

Some areas of the state, such as the Sandhills, are under-served with recreational and environmental educational opportunities. In addition, pressures of development continue to threaten sites that should be protected, such as land that contains wetlands, habitats of rare species, and other special features. It is increasingly important to identify such sites to ensure that future generations will be able to enjoy and learn from North Carolina's natural heritage.

The N.C. Division of Parks and Recreation has identified some of the most threatened natural resources in the state through the New Parks for the New Century initiative. Sites are chosen because of high conservation values, diversity, and suitability for recreation. Of the 47 sites under consideration for protection in the initiative, three were identified as potential state parks, including Carvers Creek State Park.

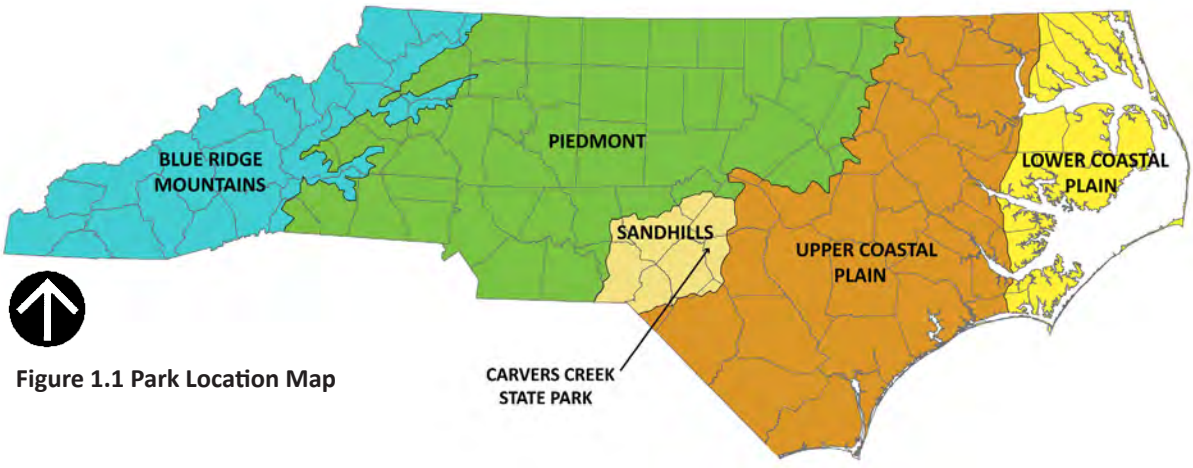


Figure 1.1 Park Location Map

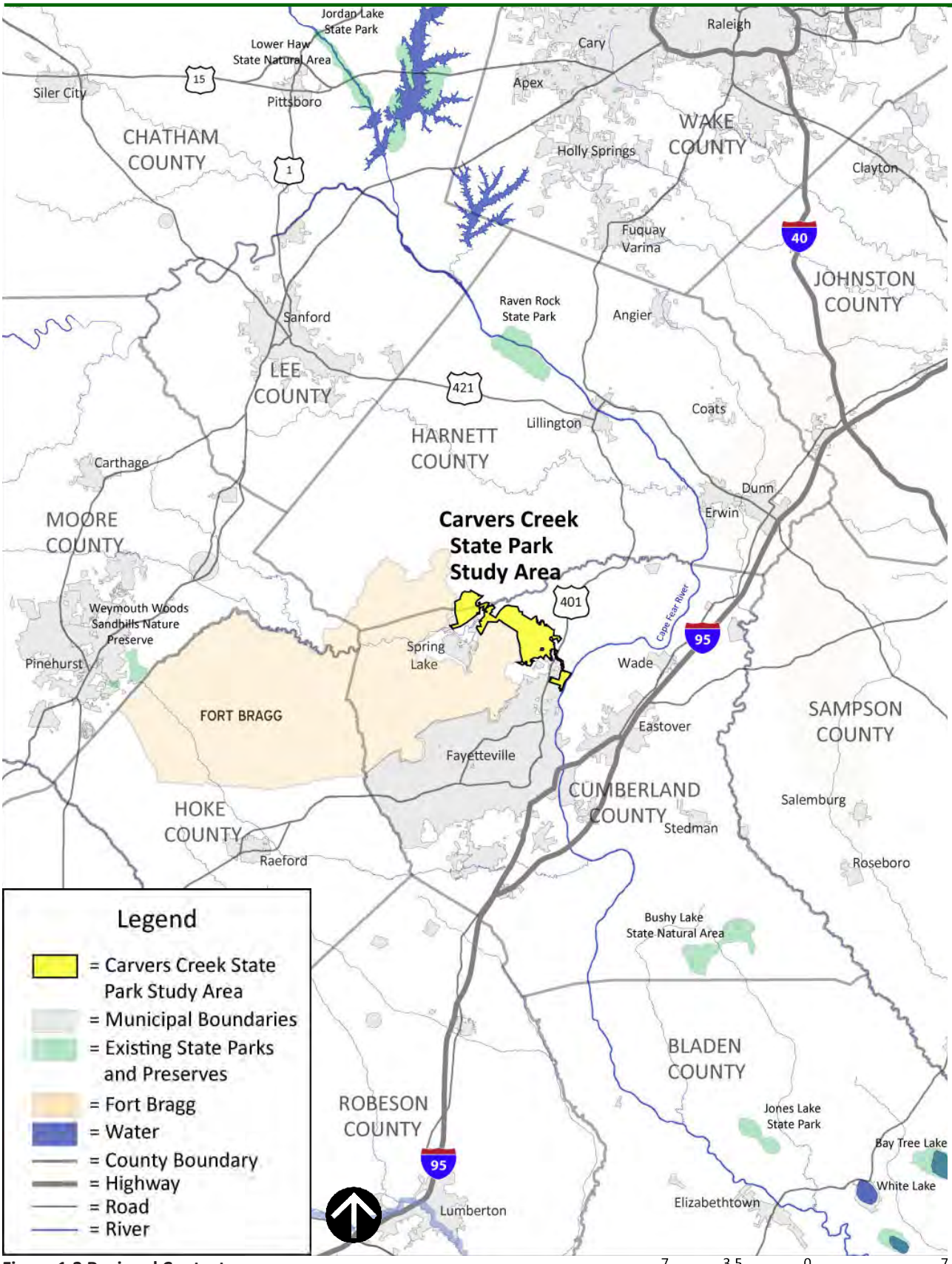


Figure 1.2 Regional Context

The study area for Carvers Creek State Park was selected as a potential state park for several reasons. The recreational need in this part of the state suggests that a state park here would be well-used. Cumberland and Harnett counties are home to some of the most biologically diverse ecosystems in the state with a very high conservation value. Several large parcels of land are still available for protection and inclusion in the state park. Many conservation partners including Sandhills Area Land Trust, The Nature Conservancy and others also maintain property in the area for protection.

Study Area Description

The study area for Carvers Creek State Park, shown in Figure 1.2, is located north of Fayetteville in the Sandhills region of North Carolina. It covers approximately 8,500 acres and is comprised of primarily agricultural and rural land. The study area is bordered to the west by Fort Bragg and to the east by the Cape Fear River. Approximately 70 miles south of Raleigh, 150 miles east of Charlotte, and 130 miles west of Wilmington; the park study area is centrally located in relation to several large North Carolina cities.

The Sandhills region is characterized by longleaf pine forests, rolling topography and sandy soil. The longleaf pine ecosystem is an important habitat for

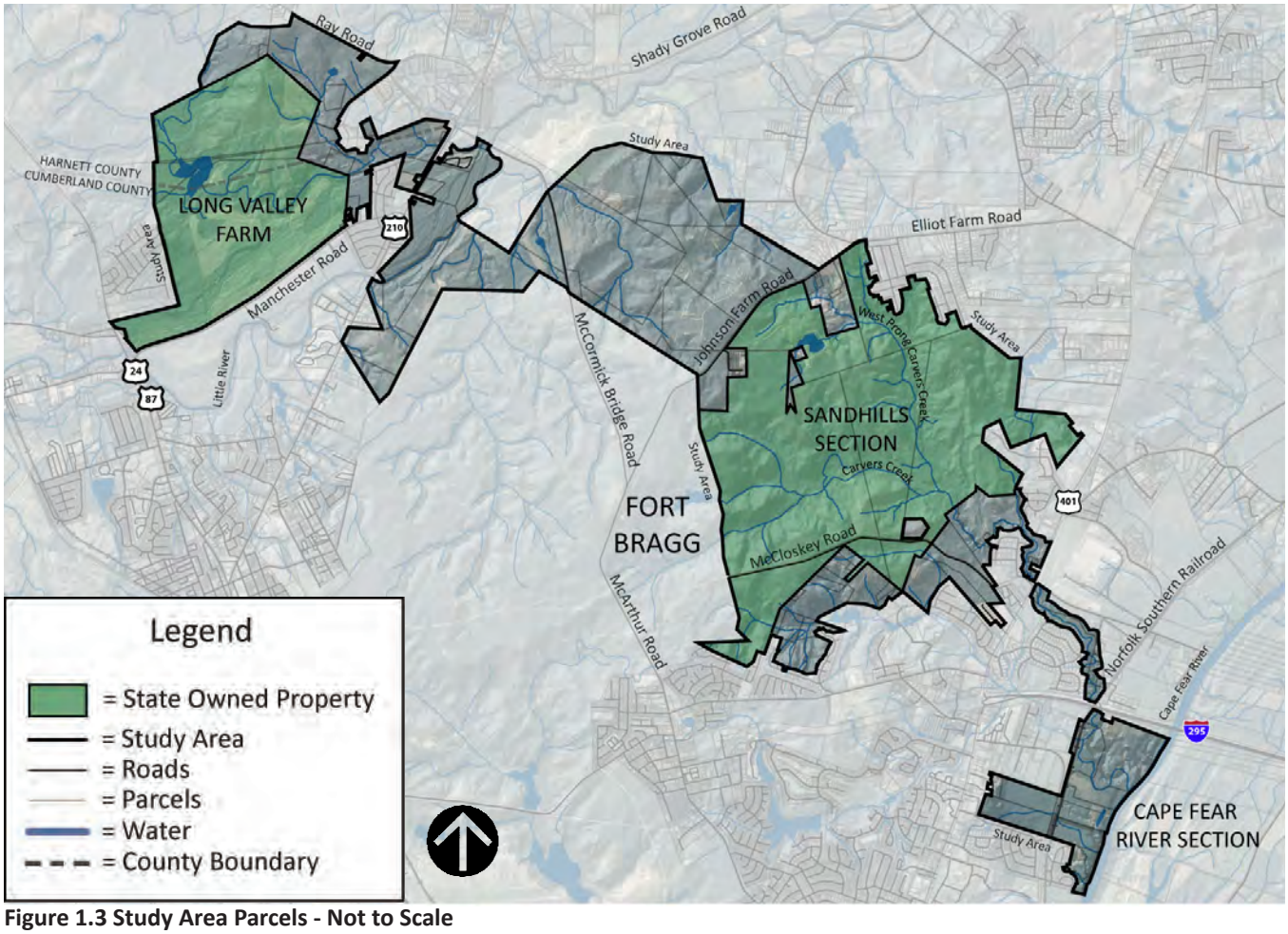


Figure 1.3 Study Area Parcels - Not to Scale

several endangered and protected plant and animal species, most notably the Red-cockaded Woodpecker. Two properties are being studied in depth in this master plan process, including Long Valley Farm in the northwest region of the study area, and the Sandhills Section, located in the central region of the study area. Each property has distinct qualities and has been identified as appropriate for conservation and/or restoration. See Figure 1.3 for Study Area Parcels.

The Long Valley Farm property is approximately 1,400 acres and straddles Cumberland and Harnett counties. Bordered to the west and the south by Fort Bragg, the site includes a combination of farmland, pasture, and woodland.

The 2,900-acre Sandhills Section is located just north of the city of Fayetteville. The site includes several mature longleaf pine stands and numerous wetlands and creeks, including the headwaters of Carvers Creek.

Cultural Resources/History of the Region

Overhills logo, courtesy of "An Oral History of Overhills," Fort Bragg Cultural Resources Management Program

Percy Rockefeller, courtesy of "An Oral History of Overhills," Fort Bragg Cultural Resources Management Program

The Paleo-Indian Period dated from circa 10000 and 8000 B.C. The earliest inhabitants of the southeastern United States were highly mobile and relied on plants and small game for sustenance. There are very few archaeological sites found today with Paleo-Indian artifacts. Population densities may have been higher in the Piedmont areas of North Carolina, rather than the Coastal Plain. However, a few artifacts from this time period have been found on Fort Bragg property.

The Archaic Period, between 8000 and 1000 B.C., brought a new reliance on a variety of food sources, such as fish, birds, wild plant resources and game animals. Settlements were still very mobile, with groups relocating to take advantages of seasonally available resources. This period is also seen as a period of adjustment to changing warmer climates.

The Woodland Period, between ca. 1000 B.C. and A.D. 1650, is characterized by pottery making, horticulture and reliance on seed crops. Settlements became more permanent due to the domestication of various seed-producing indigenous weeds. Because many more artifacts of this period are found in the Piedmont or Coastal Plain, archaeologists have had to reconstruct the American Indian pattern of settlement in the Sandhills. It is assumed that this area would have been influenced by the Siouan-speaking inhabitants of the Coastal Plain and groups who settled in the eastern Piedmont.

European settlement in the interior of North Carolina generally did not occur until the early 1700s. The area was originally settled by an influx of Scottish Highlander settlers that migrated to the Upper Cape Fear region. At that time, the Cape Fear River was the only direct water route into North Carolina from the coast, and it was a major transportation corridor for trade and commerce.

Around 1720, the land grant office for the Cape Fear opened, and settlement began along the river. The first settlements were about 100 miles north of Wilmington in the Rockfish and Cross Creek areas. This area became the cen-

ter of Scottish Highlander settlement in North Carolina. By the mid-1750s, highlanders were settling along the upper and lower Little River, and most were farmers.

The longleaf pine forests of the Sandhills proved to be the most essential economic generator of the region. The longleaf pine produces the highest quality pine rosin/crude gum of any species of pine in eastern North America. Pine tar, pitch, resin, and turpentine were made from the gum, and the trees themselves provided excellent masts and timber for ship building. In addition to the naval uses for the lumber, the longleaf pine was also timbered for home building, shingles, and barrels. The majority of the tar, turpentine, and pitch was shipped to England and the rest of the colonies. Water-powered grist and saw mills, tanneries, small iron forges and tar kilns were prominent in the region during the colonial period. The native longleaf pine forests were severely degraded by these industries and have never fully recovered.

Agricultural production generally focused on the harvest of corn, peas, beans, sweet potatoes, white potatoes, peaches, and grapes for local subsistence needs as well as local trade. Crops of rye, wheat, oats, cotton, flax, and tobacco were also raised in the region.

"Camp Bragg" was established as an Army base in 1918 on 120,200 acres, and was located in the Sandhills partly to take advantage of the year-round training climate. In 1922, Camp Bragg was redesignated Fort Bragg, after Congress decided that all artillery sites east of the Mississippi would become permanent Army posts. A longleaf reforestation program began shortly after in 1923, an early start to Fort Bragg's commitment to restoring and protecting significant cultural and natural resources as well as providing a buffer to their properties.

Historic Transportation Connections of the Region

The Cape Fear River was a vital link for trade and commerce and the primary mode of travel to get goods and products to the coastal port at Wilmington. The Cape Fear is the only river in North Carolina that flows directly to the Atlantic Ocean, therefore shipping linked Fayetteville to the rest of the country as well as the world. Fertile lands surrounding the river allowed for agriculture to flourish and settlements to grow into viable cities and towns, and the river allowed products to get to larger markets.

Fayetteville and the surrounding region thrived as waterways were the favored method of transportation; however, railroads built in the 1830s soon became the preferred alternative for transporting goods in the state. Unfortunately, the railroad network bypassed Fayetteville. A few of the area's major roads were upgraded with a planked surface. Plank roads, also known as the "Farmer's Railroad," were built during the 1840s and 1850s to allow farmers to transport their crops and other goods to market. All of the state's major plank roads converged in Fayetteville because of its importance as a marketplace. Eventually plank roads became obsolete, as costs for upkeep and extensive damage during the Civil War took their toll.

Plank Road historical sign

Long Valley Farm Mill Pavilion

Much of the regional railroad infrastructure was also destroyed at the end of the Civil War. It was not until 1879 that Western Railroad became a part of the Cape Fear & Yadkin Valley Railroad, providing Fayetteville a way to connect to the larger statewide railroad system.

A comprehensive railroad network rapidly developed in the period between 1870–1900, and formerly remote communities were soon directly linked with regional urban centers such as Raleigh and Wilmington. In an effort to seek out and develop new markets, railroad companies sent agricultural and industrial specialists into the Sandhills to evaluate the social, economic, and environmental conditions. Entrepreneurs soon followed to construct health spas, sanitariums, and resorts in the Sandhills.

With the advent of the automobile, the region became known as a half-way point for travelers along the major north/south route between the northern states and Florida.

Long Valley Farm

Long Valley Farm Dam Gates

Long Valley Farm offers a rare glimpse into the unique land-use history of Cumberland and Harnett counties during the early to mid-twentieth century. The land was part of "Ardnave," a 13,000-acre turpentine plantation owned by the McDiarmid family. The plantation produced turpentine and lumber for the naval stores industry. The McDiarmid Millpond was likely constructed to process timber.

After Daniel McDiarmid's death, the land changed hands several times and was cleared for timber. Old logging roads and cleared land offered a perfect opportunity for gaming and hunting. In 1906, the land was sold and became the Croatan Club of Manchester, a private hunt club.

In 1912, 363 acres of the Croatan Club lands, including a portion of the present day millpond, was sold to Dr. Joseph P. Ewing. This tract became the core of the present day Long Valley Farm property. He later sold the land to his brother-in-law, Robert Wall Christian.

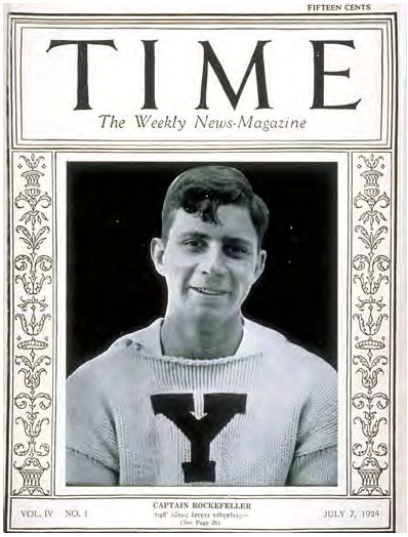
It was Christian who named the property Long Valley Farm. Robert Wall Christian was known as "one of the most successful and scientific farmers in this section of the state" (News and Observer Obituary March 14, 1927). After purchasing the land in January 1914, he enlarged his property within a year to a total of nearly 967 acres. The original 1915 acreage is the south-central section of the present Long Valley Farm. His experiments in scientific farming were documented in the Soil Survey of Cumberland County issued by the USDA in 1925. He explored techniques of crop rotation, artificial fertilization, and artificial drainage.

Christian was elected to the North Carolina Legislature in 1924 and introduced legislation to provide a farm agent in every North Carolina county. He was the president of the state Farmer's Association and the chairman of the Cumberland County Board of Commissioners and the County Board of Agriculture.

After his death, the land was sold to Percy Avery Rockefeller (nephew of John D. Rockefeller) and Windsor T. White. The present day Long Valley Farm was once part of Overhills, Percy Rockefeller's private winter estate.

During the interwar period of the 20th century (1919-1939) wealthy northern industrialists began constructing southern estates for use as winter and vacation residences and hunting and gaming lodges. Several examples of these "gentleman's estates" in North Carolina include the Biltmore Estate in Asheville, The Whalehead Club in Corolla, Overhills in Fort Bragg, and Long Valley Farm in Cumberland County.

James Stillman Rockefeller, a New York City banker and Percy's nephew, acquired both Rockefeller's and White's interest in the property in 1937. He graduated from Yale University in 1924, and that same year he won a gold medal in rowing at the Summer Olympics in France. He appeared on the cover of Time magazine on July 7, 1924.


FIFTEEN CENTS

TIME

The Weekly News-Magazine

CAPTAIN ROCKEFELLER

VOL. IV NO. 1 JULY 7, 1924

James Stillman Rockefeller, Time Magazine, July 7, 1924

The Rockefellers built their residence on the site of Christian's home, adjacent to the millpond. Christian's house was moved to another part of the property. Rockefeller lived there year-round while he was serving in the Airborne Command during World War II. Rockefeller also bought the additional acres of woodlands located north of the original 1914-1915 farm to bring the total acreage to the present day 1,420 acres.

Mr. Rockefeller was involved in the day-to-day operations of the farm. He enjoyed learning and experimenting with new farming methods. He also liked to oversee the cattle and crops being raised by his farm managers. His family visited the property several times a year and on most holidays. They enjoyed swimming and fishing in the pond as well as hunting and walking the trails around the property. James Stillman Rockefeller passed away in 2004 at age 102. He wished to see the farm permanently protected from development, so he left the property to The Nature Conservancy, who transferred the property to North Carolina State Parks.

Sandhills Section

Sustainability

Sustainable practices have been used throughout the history of Long Valley Farm. Water was used to generate electricity and run the mill. Farm buildings were sited to take advantage of passive heating and cooling. Trees were planted strategically to cool the buildings in summer while allowing in the sun's heat in cooler months. Crop rotation methods increased farm production and reduced stress on the soil. Farm fields were sited to take advantage of existing woodlands as wind breaks, shielding crops from damaging winds. Building materials from older structures were often re-purposed in new structures as they were built on the site.

Sandhills Section History

While the Sandhills Section does not contain any historic buildings or structures, it was frequented by American Indian groups, and later used in the production of naval stores and timber industries.

Sandhills Section

Park Land Acquisition History

Long Valley Farm

The Long Valley Farm property transferred from The Nature Conservancy to the N.C. Division of Parks and Recreation in 2010. After acquiring the property in 2004, The Nature Conservancy restored much of the land into longleaf pine habitat during its years of ownership.

Sandhills Section

The first portion of the Sandhills Section was transferred from The Nature Conservancy to the state in 2006, and the second portion was transferred in 2010. The property was previously owned by the Clark family. In 1996, it was deemed a "safe harbor" property under the Safe Harbor Agreement, which is a voluntary agreement involving private landowners and the U.S. Fish and Wildlife Service that allows for endangered species to prosper on homeowner's land.

The Nature Conservancy acquired the first portion of the Sandhills Section in 2001 and began restoration of the longleaf pine habitat. In addition, The Nature Conservancy pioneered a conservation program with Fort Bragg to preserve, protect and restore Red-cockaded Woodpecker habitat while also providing a buffer to sensitive military operations. In addition to the increased security, the green space, or Greenbelt, is an added recreational benefit to soldiers, their families, and the entire region. This conservation partnership has been in place for over a decade and provides more than 14,000 acres of buffer around the base. The Long Valley Farm property is included in this conservation partnership, providing a much needed buffer to Fort Bragg's northern training zones. Long Valley Farm also lies along the runway approach to Pope Air Force Base, so the conservation of this area ensures that encroaching development will not conflict with continued training flights.

Other conservation groups work in the Sandhills region to preserve the fragile ecosystem and restore habitat to the endangered species found there. Local conservation partners include the Sandhills Area Land Trust, the North Carolina Sandhills Conservation Partnership, and others.

Analysis of Site Context and History

The first inhabitants of the region populated the area because of it's location along the Cape Fear River, which eventually brought more people, trade and commerce to the region. As the area grew and became prosperous, railroads brought even more opportunities for connections to the state and the rest of the country. It was these connections that eventually enticed wealthy northern industrialists to visit the area and begin building gentlemen's estates for recreation. Long Valley Farm is one of the last remaining estates from this era.

The creation of Long Valley Farm as an agricultural estate by Christian and its subsequent expansion as a winter agricultural estate by the Rockefellers in the late 1930s and 1940s was a reflection of what was happening in the

Sandhills region. The development of scientific farming and agriculture coincided with the influx of wealthy land owners seeking land for gaming and recreation, and it occurred on lands that were portions of former plantations.

As Fayetteville and Fort Bragg continue to expand, large tracts of agricultural land will disappear to make way for urban and suburban development. The rich rural history and sense of place should be preserved for future generations.

In addition to the rich cultural history, the Sandhills region enjoys an incredibly diverse ecosystem and represents an incredibly important ecological addition to the state park system.

2 REGIONAL CONTEXT AND PLANNING

Introduction

The following section gives an overview of the regional and local planning efforts. Also included is information related to population and demographics, environmental resources, transportation, bicycle and pedestrian links, and recreation.

New construction in the region

Population and Demographics

The City of Fayetteville, with a population of approximately 174,000, is the largest city in the region and the fifth largest metro area in the state. The Town of Spring Lake has a population of approximately 8,200. On September 1, 2008, the Town of Spring Lake annexed Pope Air Force Base and portions of the Fort Bragg Range and Training Area.

The Base Realignment and Closure (BRAC) and the Global Defense Posture Realignment initiatives are impacting Fort Bragg and the surrounding region with a large surge of population growth. The Preliminary Impact Assessment for the region prepared by the BRAC task force in 2008 projected population growth for the 11 counties in the region. According to the 2008 census, the region was home to just under 950,000 people. The BRAC assessment predicted that the region would grow to a total population of over one million people by 2013 as a result of the base realignment and other growth initiatives.

Longleaf pine habitat at Fort Bragg

Land Use Planning

Within the study area, several municipalities have planning jurisdiction, including Cumberland County, Harnett County, Town of Spring Lake and the City of Fayetteville. Cumberland County has jurisdiction over much of the study area and provides land use and transportation planning as well as zoning and subdivision administration. A small portion of Long Valley Farm is within Harnett County, and a small portion of the study area is within the City of Fayetteville.

The Cumberland County 2030 Joint Growth Vision Plan was developed to assist local governments in creating policies and growth strategies for economic development and land use within the region.

The Long Range Component of Fort Bragg's Real Property Master Plan (2008) assesses existing facilities and infrastructure and develops a long range land use plan for Fort Bragg. This document refers to several partners in planning such as BRAC Regional Task Force, Sustainable Sandhills, the N.C. Conservation Partnership, the Fort Bragg/Pope Air Force Base Regional Land Use Advisory Commission, Inc., Sandhills Conservation Partnership, the U.S. Fish and Wildlife Service, and others.

The Fort Bragg/Pope Air Force Base Regional Land Use Advisory Commission is a regional planning organization that serves as a forum to encourage better planning and communication between local governments, municipalities and Fort Bragg. One of its initiatives included the purchase of the Overhills Estate in 1997 to expand training areas and protect Fort Bragg and Pope Air Force

Base from urban encroachment. The purchase also provided additional land for conservation and restoration.

The Sustainable Sandhills initiative includes stakeholders from six counties in the region, Fort Bragg, as well as the Department of Environment and Natural Resources. The steering committee's main goals include awareness and education, eco-tourism and supporting local agriculture, creating cultural connections, green business and design, land planning, and recycling.

Environmental Resources

The Sandhills region is home to many endangered or threatened plant and animal species, most notably the Red-cockaded Woodpecker. A variety of public lands are located in the area including Weymouth Woods Sandhills Nature Preserve and the Sandhills Game Lands.

The Fort Bragg Greenbelt is primarily located to the south of Fort Bragg. It includes 6,500 acres of perimeter land set aside for buffer and conservation.

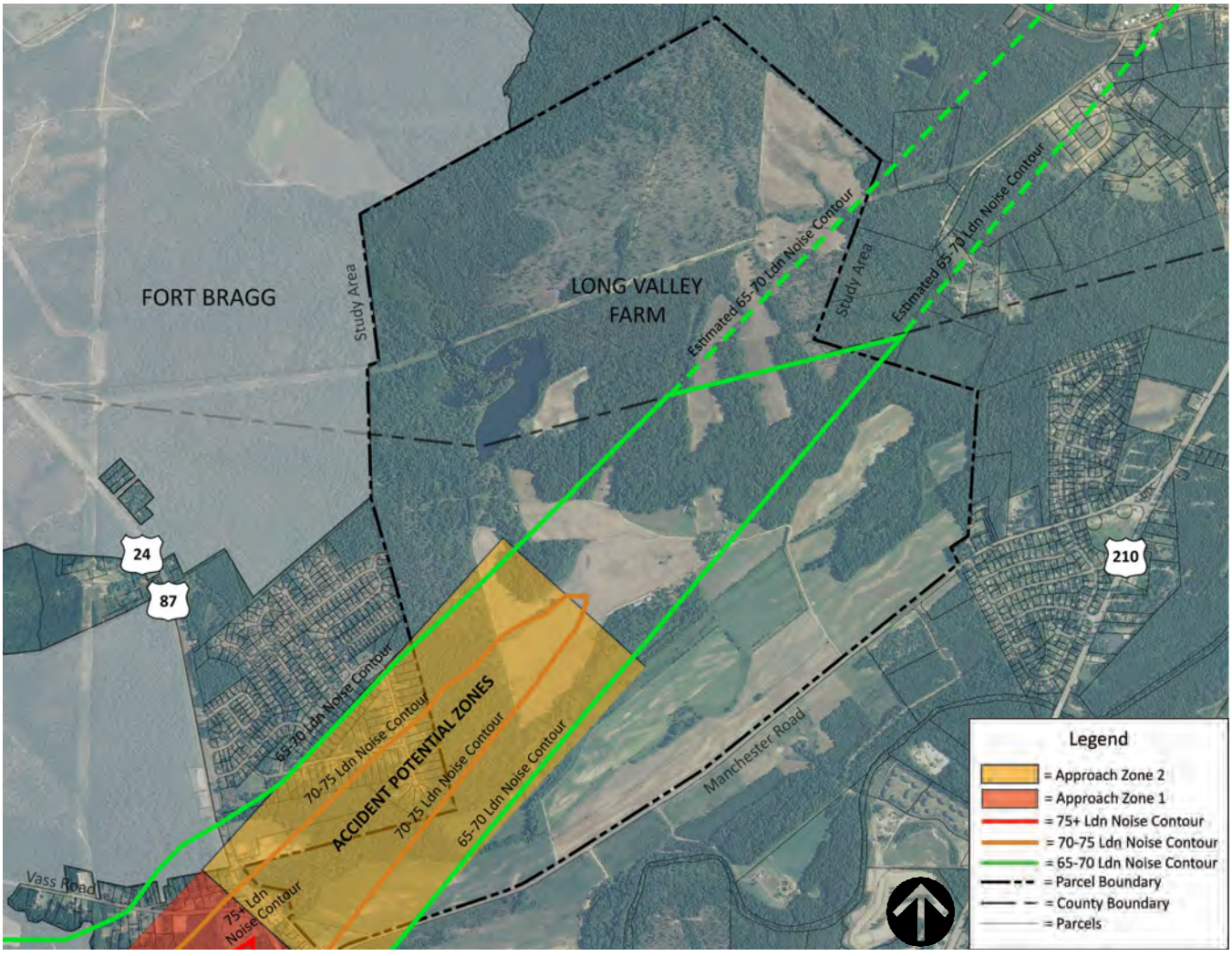


Figure 2.1 Long Valley Farm Noise Contours and Accident Potential Zones - Not to Scale

Fort Bragg intends to extend the Greenbelt around the northern portion of the base in the future. The Long Valley Farm property lies within the proposed northern Greenbelt area.

Flight pattern over Long Valley Farm Agricultural Complex

Fort Bragg/Pope Air Force Base Noise Impacts

On any given day of the week, approximately 200 takeoffs and landings occur at Pope Air Force Base, with noise impacts on the Long Valley Farm property. On a busy day, 216 flights are possible. On average, a takeoff or landing is occurring 11 to 13 times an hour. Long Valley Farm is also impacted by the Potential Accident Zone II which is shown on Figure 2.1. It is not expected that development at Long Valley Farm will be incompatible with this zone, however, noise impacts should be taken into consideration.

Regional Transportation

The Fayetteville Area Metropolitan Planning Organization (FAMPO) released a 2035 Long Range Transportation Plan for Cumberland County, a small section of southern Harnett County, as well as part of Hoke County in April 2009. The cities and towns included in the area are Fayetteville, Spring Lake, Hope

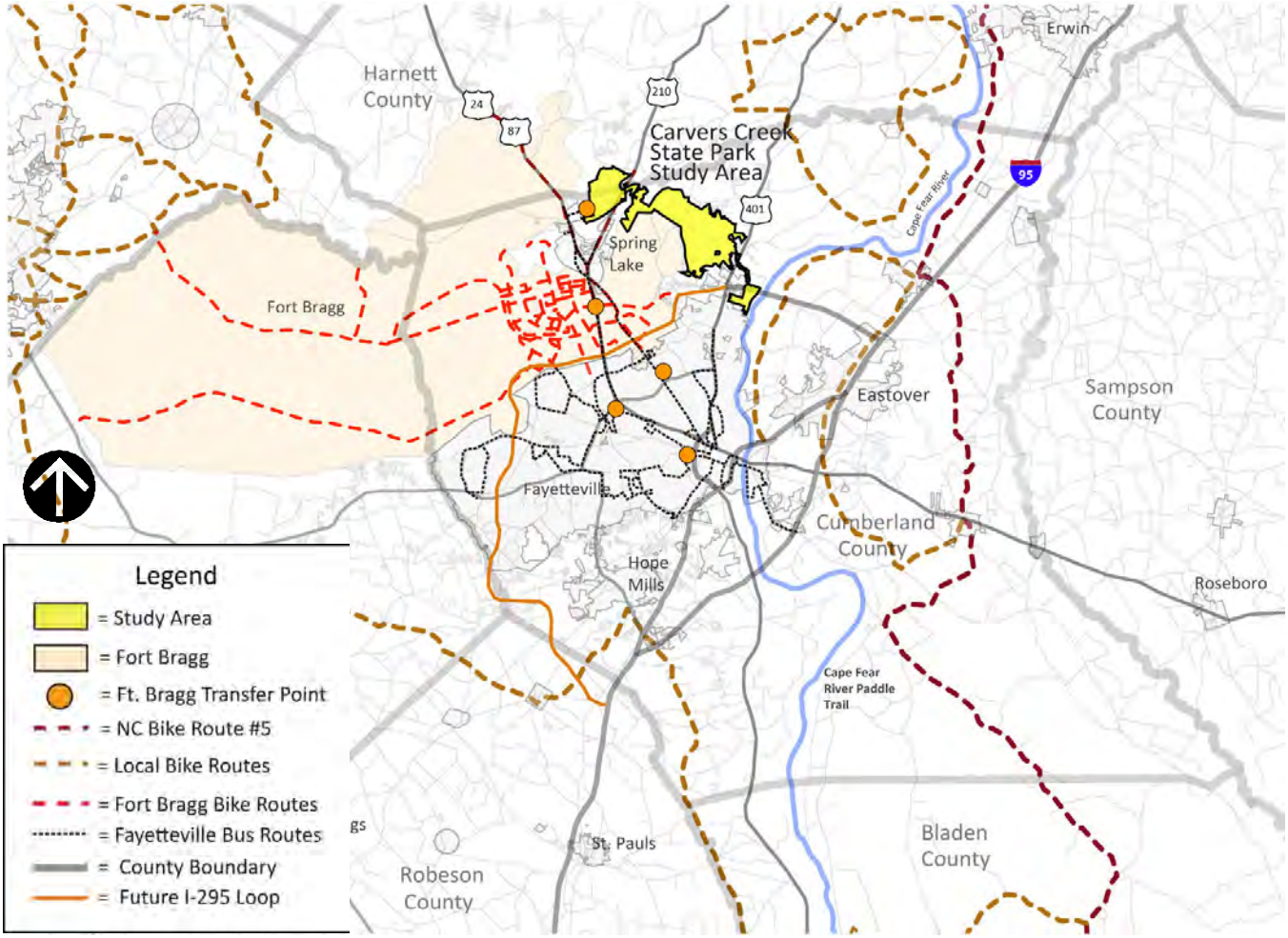
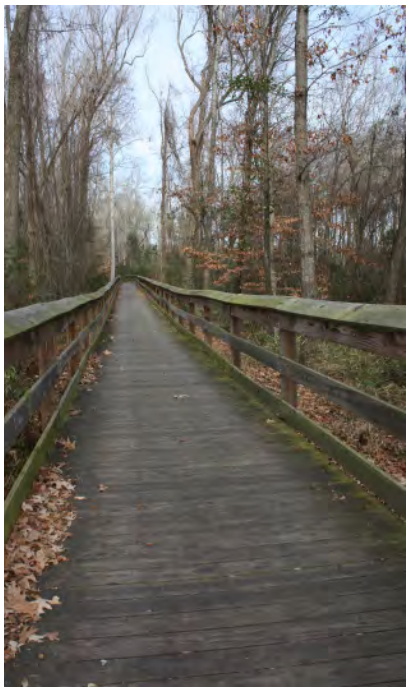


Figure 2.2 - Regional Map - Transportation - Not to Scale



Cape Fear River Trail

Mills, as well as the Fort Bragg Military Reservation and Pope Air Force Base. In anticipation of continued development and increased population, the plan includes infrastructure, bicycle and pedestrian, transit and rail improvements in the region. See Figure 2.2 for Regional Map of Transportation.

The regional plan highlights several proposed new roads and road widening projects. Within the study area, FAMPO has identified McCloskey Road, Andrews Road, portions of McArthur Road, Elliot Farm Road, Elliot Bridge Road, and Ramsey Street (Highway 401) as roads in need of widening to accommodate future capacity. Each of these roads have the possibility of affecting the transportation circulation throughout the study area.

The future I-295 outer loop will serve as a critical transportation link for the region. The extension will improve access to I-95, offering a direct route for those in the Fort Bragg and Spring Lake area. Although located to the south of the study area, the outer loop will improve connectivity in the region.

Public Transportation

Fayetteville's transit system, Fayetteville Area System of Transit (FAST), links the city with a series of bus routes and shuttles. Fort Bragg has a shuttle bus system and provides a transfer point at Murchison Road, allowing connection to the FAST system.

Regional Bicycle, Pedestrian Trails, and Greenways

Currently, no bike lanes are provided on roads in the park study area. Several road projects under the NC DOT Transportation Improvement Program were approved to include bike lanes. Ramsey Street (Highway 401) has been identified as a proposed bicycle corridor, and could eventually provide a connection to state park property.

Two mountain bike trails are located on Fort Bragg, both average seven to eight miles in length. Several "unofficial" on-road bike routes are used by local citizens for group rides.

Fort Bragg has identified proposed bicycle paths in order to create connections to surrounding municipalities. These paths have the potential to become part of a greater alternative transportation network, and perhaps link to the state park.

Recreational trails at Fort Bragg include the Coscom Trail (0.64 miles), the Engineer Trail (1.55 miles), the Son Tay Trail (2.45 miles), and the Smith Lake Trail (6.10 miles). See Figure 2.3 for Regional Map of Trails, Greenways and Parks.

Presently, no greenways are provided in the study area, however, FAMPO is working on a planning document that will investigate possible pedestrian and bicycle connections in the region, linking routes with those that already exist in Fayetteville. Several of these routes may be identified in the park study area.

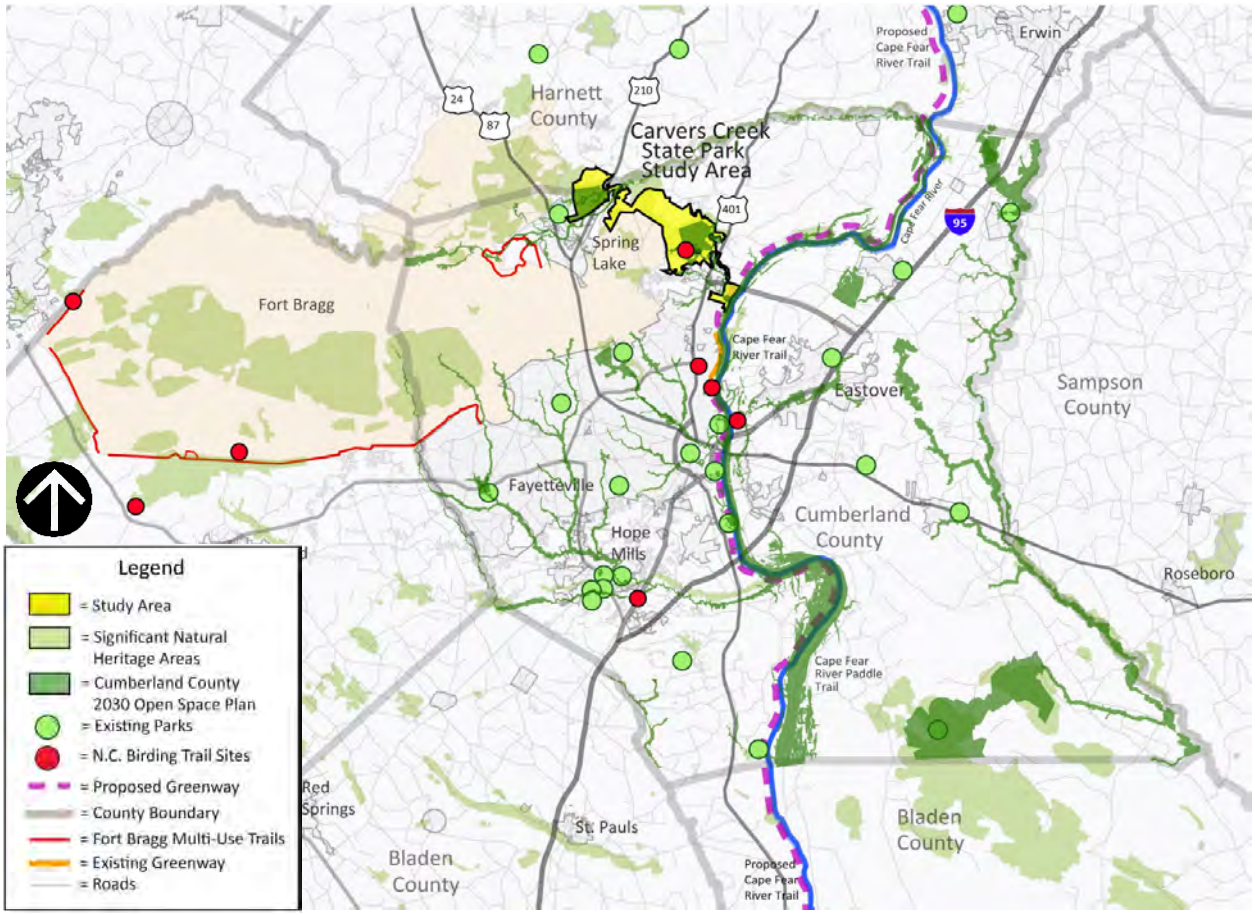


Figure 2.3 Regional Map - Trails, Greenways and Parks - Not to Scale

The Cape Fear River Trail is a multi-use trail that is designated as a part of the East Coast Greenway. The East Coast Greenway is designed to be the nation's first long distance, multi modal transportation corridor for cyclists, hikers and non-motorized users and will eventually connect from Maine to Florida. The local section of the East Coast Greenway is comprised of a 4.2-mile series of urban trails in Fayetteville. The existing portion of the trail along the Cape Fear River will provide a future link to the park.

The Cape Fear Run/N.C. Bike Route is a 160-mile bike route that roughly parallels the course of the Cape Fear River through the southeast coastal plain to the Atlantic Ocean. Points of interest along the route include Jones Lake State Park, Moore's Creek National Military Park, the USS North Carolina Battleship Memorial, Brunswick Town State Historic Site, Carolina Beach State Park, and Fort Fisher State Recreation Area. Although this route is located to the east of the Cape Fear River and is not currently within the study area, linkages could be made in the future.

The North Carolina Coastal Paddle Trail begins at the J. Bayard Clark Park in Fayetteville and stretches through the coastal plain of North Carolina to Southport. Paddlers can enjoy birding, fishing, exploring historic sites and visiting small communities along the river.

The North Carolina Birding Trail is a virtual trail that links existing bird watching sites across the state, connecting birders with local communities, businesses and other cultural and educational attractions. Four sites in Cumberland County are represented on the Piedmont section of the Trail; J. Bayard Clark Park, the Cape Fear River Trail, Cape Fear Botanical Garden, and Carvers Creek State Park.

Parks and Recreation

Some of the existing parks in the region include Lake Rim Park, Arnette Park, Mazarick Park, J. Bayard Clark Park, the Cape Fear Botanical Gardens and Mendoza Park. Refer to Figure 2.3 for Regional Map of Trails, Greenways and Parks.

Lake Rim Park is a 30-acre community park located on Tar Kiln Drive in Fayetteville. The park offers picnicking, walking trails, and ranger-guided environmental tours emphasizing wetlands, the historic naval stores industry, animal adaptation, and water quality.

Arnette Park is a 100-acre regional park located on Old Wilmington Road in Fayetteville. Arnette Park consists of baseball fields, sand volleyball courts, a concession stand, horseshoe pits, disc golf, picnic pavilions, a playground, tennis courts, nature trails, restrooms, and natural woodlands.

Milton E. Mazarick Park is an 80-acre regional park located on Belvedere Avenue in Fayetteville. Mazarick Park is mainly a recreational venue, offering a softball field, concession stand, fishing pier, rowboat rental, trails, playground, tennis courts, and disc golf.

J. Bayard Clark Park is a 76-acre regional park located on Sherman Drive in Fayetteville. The primary focus of Clark Park is to preserve the environment and educate the public about native plants and wildlife. Clark Park is staffed by park rangers who lead frequent school visits and educational workshops. The park consists of a Nature Center, walking trails, a trail head for the Cape Fear River Trail, primitive camping and a canoe launch. The park also has a 35-foot waterfall, which some say is the tallest waterfall in North Carolina's Coastal Plain.

Mendoza Park - town of Spring Lake

The Cape Fear Botanical Garden is located at 536 N. Eastern Boulevard in Fayetteville. The garden is maintained by staff and volunteers, and serves as a prime location for community events.

Mendoza Park is located in the Town of Spring Lake on Hwy. 87 just south of the Cumberland/Harnett county line and adjacent to Long Valley Farm. Mendoza Park offers baseball/softball fields, picnic areas, a playground, a large open space area, walking trails, seating areas, and concessions.

Fort Bragg's Family and Morale, Welfare, and Recreation Directorate operates several recreational amenities including Smith Lake Recreation Park, Wilson Park, two golf courses, 11 gyms and several trails. Smith Lake Recreation Park is located one mile outside of Fort Bragg on Hwy 210 (Murchison Road) near Simmons Army Airfield, and is open to the public. The park includes camping

(RV and cabins), mountain bike trails, paint ball facilities, riding stables, volleyball, shelters, swimming area, beach, and playground.

Wilson Park is located off Butner Road in Fort Bragg and is open to the public. Facilities include picnic shelters, playgrounds, restrooms as well as a fishing dock on McFayden Pond.

Recreational Needs Analysis of the Region

The National Survey of Recreation and the Environment (NSRE) interviewed approximately 90,000 Americans in random-digit-dialing telephone samplings between 2002 and 2007. Of those 90,000 surveyed, approximately 3,000 were North Carolina residents. The primary purpose of the NSRE is to learn about approximately 85 specific outdoor recreation activities of people aged 16 and over in the United States. In general, North Carolina residents have fairly high participation rates in most outdoor recreation activities. This is due in part to a combination of abundant recreation resources and a reasonable climate which allows for a wide range of outdoor experiences.

According to the 2002-2007 NSRE, the five most popular outdoor recreational activities in North Carolina are walking for pleasure, attending family gathering outdoors, visiting nature centers, sightseeing, and picnicking.

Walking is the single most popular activity, with over five million participants statewide. The second most popular activity is attending outdoor family gatherings (also with over five million participants). Other activities with over three million participants include picnicking, gardening, driving for pleasure, viewing or photographing natural scenery, visiting nature centers, attending outdoor sports events, and sightseeing.

Activities with roughly 1.5 to 3.0 million participants include attending outdoor concerts, playing yard games, day hiking, running or jogging, visiting a wilderness area or historic site, viewing or photographing wildflowers and trees, visiting a beach, swimming in lakes and streams, motor boating, swimming in outdoor pools, boating and fishing. Those activities with roughly 500,000 to 1 million participants include primitive camping, hunting, backpacking, cold water fishing, tennis, and golf.

Outdoor recreation in a developed area is by far the most popular form of recreation in North Carolina. More residents participate in walking for pleasure (82 percent) and attending outdoor family gatherings (74.6 percent) than any other overall activity. Other activities, such as gardening or landscaping (65.4 percent), or driving for pleasure (58.2 percent) are also favorites with North Carolina residents.

Visiting wilderness areas is the most popular nature-based land activity (29.8 percent) in the state of North Carolina. Hiking is also a popular activity (29.7 percent) and visiting a farm or agricultural setting continues to be a popular activity with roughly a third of residents participating. Just over 20 percent of state residents also indicate an interest in driving off-road and participating in developed camping. The somewhat specialized, technical outdoor pursuits usually requiring special gear like rock climbing and mountain climbing are

among the least popular nature-based land activities with only 5 percent or less participating.

Statewide, the largest percentage of residents participating in viewing or learning activities are viewing or photographing natural scenery (57 percent), followed by visiting outdoor nature centers and zoos (52.9 percent). Over half of state residents have gone sightseeing within the last year, while just under half visited historic sites or viewed wildlife or wildflowers.

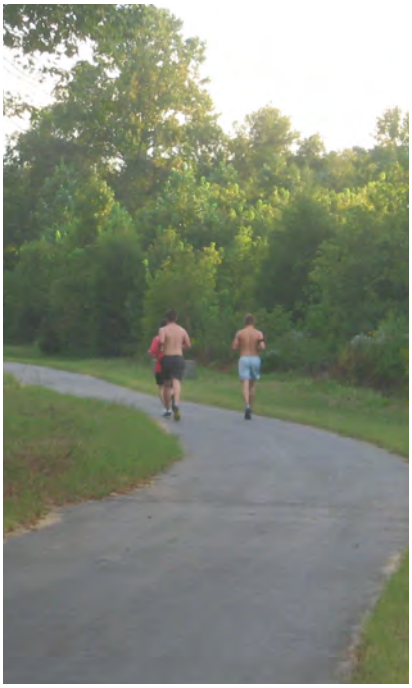
Close to half of North Carolina's residents visit beaches and nearly 40 percent go swimming in pools, lakes or streams. In addition, between 20 percent to 30 percent of residents have participated in some type of boating or fishing.

Individual outdoor sports continue to be popular, with over a quarter of North Carolina residents running and jogging (28.3 percent). Tennis (14.8 percent) and golf (13.9 percent) were also somewhat popular with North Carolina residents. It is worth noting that almost 10 percent of residents also enjoy inline skating.

Team sports have seen a decline in participation in recent years. Less than 10 percent of North Carolina's residents indicate participation in an outdoor team sports activity within the last year.

Fayetteville/Cumberland County 2005 Parks and Recreation Survey

In 2005, a survey of residents from portions of Cumberland County (not including Fort Bragg, Pope Air Force Base and the Town of Spring Lake) was conducted to determine current and future park and recreation needs as well as to determine how these services could be funded. 403 random telephone interviews were conducted using a questionnaire.



Jogging and walking are popular activities in North Carolina

Over 70 percent of respondents currently use a public park in Cumberland County, and residents older than 55 were least likely to have used park facilities. Most park users visit parks quite often; 50 percent indicate that they visited between six and 50 times per year.

Most respondents indicated that they use parks most often for walking or jogging. Picnicking, visiting playgrounds, and visiting museums or historic properties are also popular activities. Interest in activities such as swimming (30 percent), fishing (29 percent), and camping or hiking (28 percent) were also noted.

The four leading activities were walking/jogging (88 percent), picnicking (87 percent), visiting museums or historic properties (87 percent), and attending concerts and performing arts events (80 percent). Nature or environmental programs were also popular (71 percent). Based on the percentage of those interested in walking, jogging, and picnicking, there is a further indication that visiting museums or historic properties would be quite popular. The establishment of greenways and senior centers also appears to have strong support.

Regional Land Use

The study area falls under the zoning jurisdictions of Cumberland County, Harnett County, the city of Fayetteville and the town of Spring Lake. See Figure 2.4 for the Zoning Map on the following page.

Long Valley Farm is zoned Rural Residential in both Cumberland County and Harnett County. According to the Cumberland County zoning codes, the Rural Residential district is traditionally for rural use with lots of 20,000 square feet or more. The principal use of the land in this district is for low-density residential, including manufactured housing units, and agricultural purposes. This district is intended to ensure that residential development not having access to public water supplies and dependent upon septic tanks for sewage disposal will occur at a sufficiently low density to provide for a healthy environment. Long Valley Farm borders the town of Spring Lake, but is under county jurisdiction. The tract is bounded by Rural Residential to the north (in Harnett County), Residential to the east (in Cumberland County), military use to the south, and Residential to the west.

The Sandhills Section is zoned Planned Neighborhood Development. According to the Cumberland County zoning code, a Planned Neighborhood District is a conditional use district designed for the planned development of various residential densities concurrent with neighborhood-oriented uses in a single project. The Sandhills Section is bounded by Planned Neighborhood Development, Residential and Agricultural to the north, Planned Neighborhood Development to the east, Residential and Planned Neighborhood Development to the south, and military use to the west.

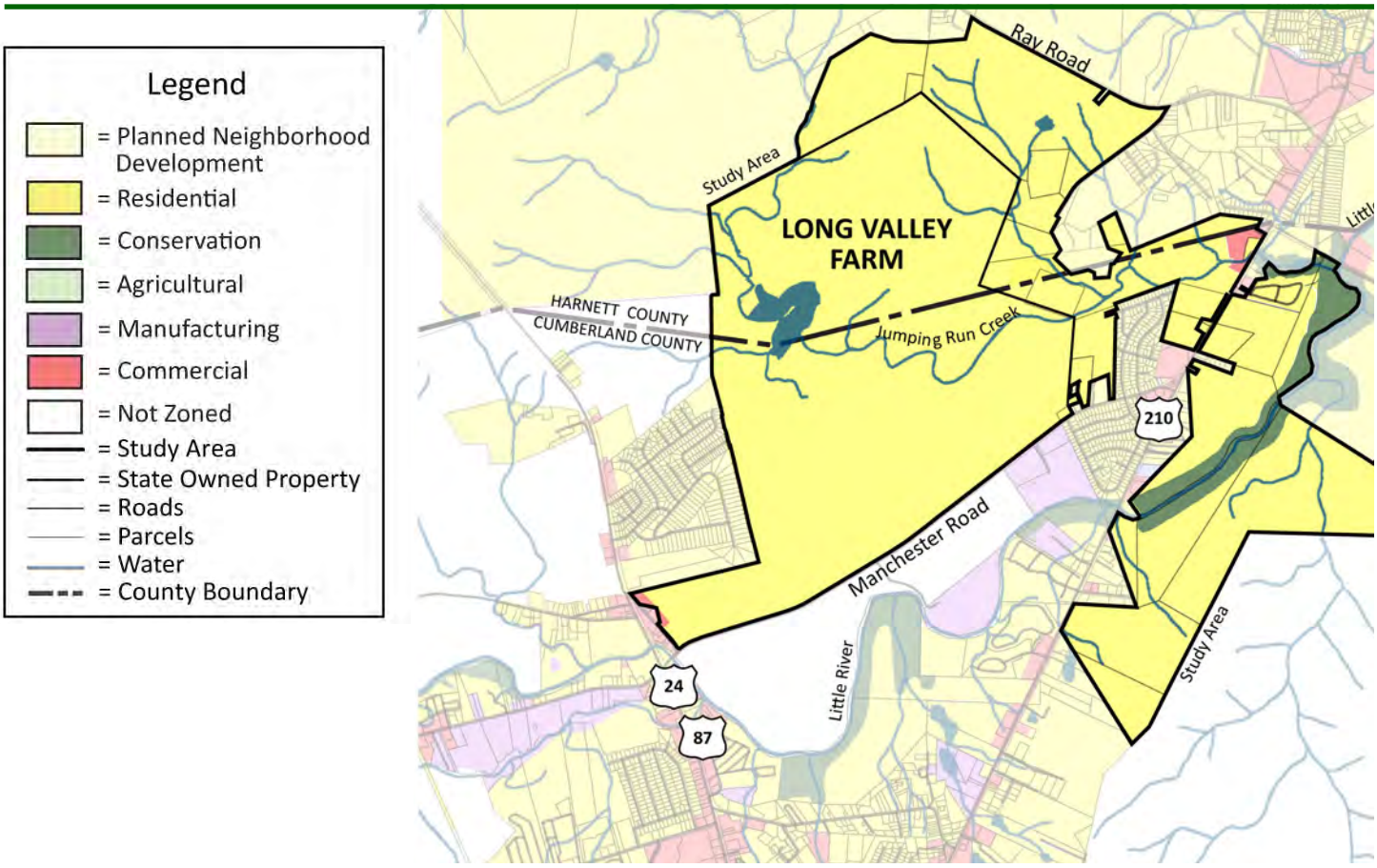
North Carolina has rapidly lost farmland over the past decade. Cumberland, Harnett, Hoke, Lee and Moore counties are all experiencing a very high rate of farmland and forest conversion to residential development. The rapid development of these areas is fragmenting the Sandhills' ecosystem, as well as changing the rural character, sense of place and quality of life of the region.

Analysis of Regional Context and Planning

The area is rapidly urbanizing. The base realignment at Fort Bragg will result in a large population increase, and the rural character of the study area will likely change. Connectivity between these large population areas and points of interest will be increasingly important for recreational opportunities in the region.

Several planning organizations coordinate with local municipalities to ensure that all stakeholders are part of the long-range planning, making sure that important cultural and natural resources are preserved for future generations. The conservation partners in the area and the N.C. Division of Parks and Recreation will mutually benefit from these relationships.

Many regional opportunities exist for connections to transportation routes, bicycle and greenway connections, and parks and recreation resources. As the region continues to grow, these connections will become more important to the Sandhills.



According to recreation surveys and need assessments for both the state of North Carolina and Cumberland County, the most popular outdoor activities could be easily accommodated within the study area. These include walking, attending a family gathering, visiting nature centers and participating in environmental programs, picnicking, attending concerts and performing arts events, and visiting museums or historic properties.

The Zoning Map, Figure 2.4, shows that the study area is mostly zoned Residential, with small areas of Conservation and Commercial.

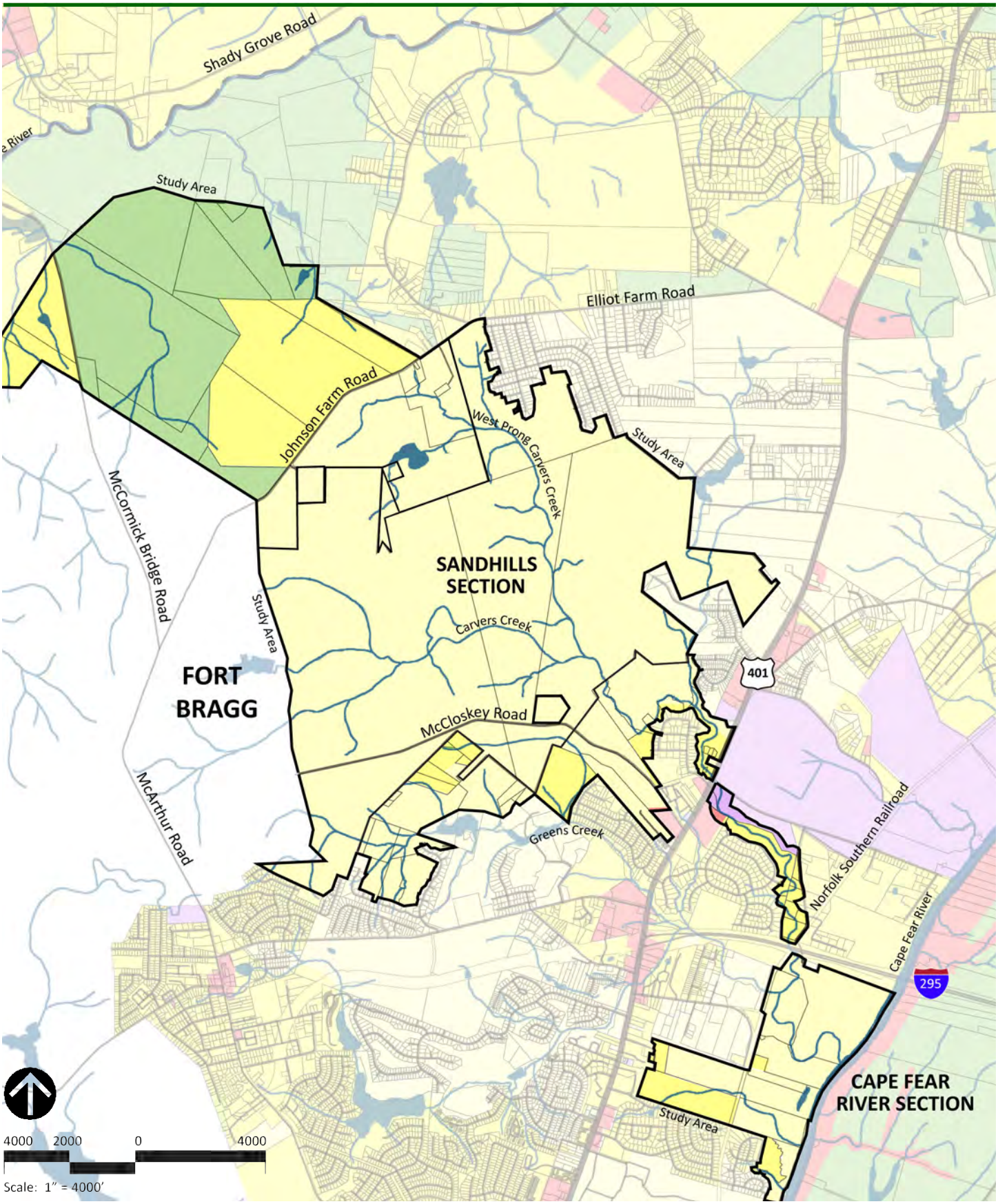


Figure 2.4 - Zoning Map

3 EXISTING FACILITIES AND INFRASTRUCTURE

Carvers Creek State Park Study Area

The study area for the state park is within one of the fastest growing regions in the state. This area is rapidly urbanizing and the once rural agricultural character of the region is quickly changing. New subdivisions, commercial and industrial areas are fragmenting wildlife corridors and natural areas. Existing infrastructure such as road and utility networks are also expanding, allowing for greater access for specific properties, but often limiting pedestrian and wildlife connections. The study area is bisected by several major highways including U.S. 401, N.C. 210, N.C. 24/87, and I-295 as well as McCormick Bridge Road (SR 1600), Johnson Farm Road (SR 1605) and Andrews Road (SR 1611). The Norfolk Southern Railroad also bisects the study area, further limiting connectivity with the Cape Fear River.

Long Valley Farm road

Long Valley Farm

Long Valley Farm is located approximately two miles north of the town of Spring Lake on Manchester Road (S.R. 1451) between N.C. 210 and N.C. 24/87. The site includes areas of cultivated fields (many of which have been planted in longleaf pine for conservation), fenced pasture, woodlands, wetlands and small farm ponds, the McDiarmid Millpond, several farm roads and paths, and various historic buildings and structures.

Road along millpond at Long Valley Farm

Roads

Long Valley Farm has approximately 1.80 miles of road frontage on Manchester Road (S.R. 1451). Two unpaved roads about three-quarters of a mile apart serve as entrances to the site, and both are gated. These entrances bisect the North Carolina Ecosystem Enhancement Program (NCEEP) restoration project on the site. The entrances are within two 60-foot easements granted by NCEEP, and another easement follows an existing overhead powerline. The three easements are the only three access easements to Manchester Road. The road to the west extends to the farm seat complex in the center of the property. The road to the east leads to the main agricultural complex, and according to the National Register of Historic Places, was used mostly by family and staff. This road loops around and intersects with the first entrance road just south of the farm seat. This road continues west through the woods to the Overhills property. Another farm lane intersects with the main road east of the farm seat and extends to the north end of the property. Other farm roads cross the site to allow access to most parts of the property. Arrowhead Road in Deerfield, the adjacent residential neighborhood to the west of the parcel, dead-ends at the property line. This road will not be considered for future vehicular park access, but could be considered for pedestrian access into the park.

Long Valley Farm road

Buildings, Structures, and Facilities

The existing structures at Long Valley Farm are a nationally significant collection of buildings. The National Register of Historic Places inventory of buildings and structures at Long Valley Farm grouped the existing buildings into the following three categories: Farm Seat Complex, the main Agricultural Complex, and other farm structures. Thirty contributing resources including

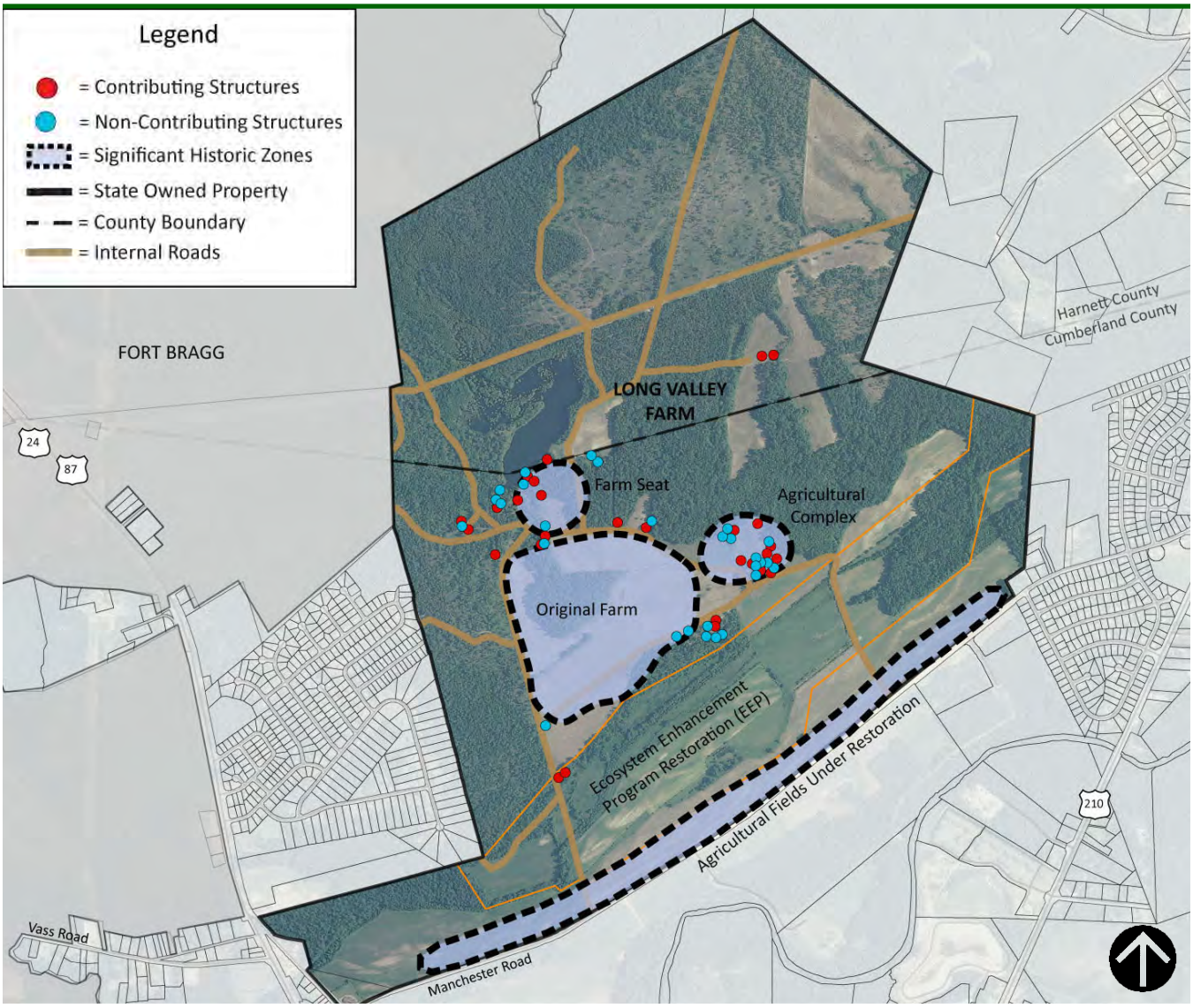


Figure 3.1 Long Valley Farm - Contributing and Non-contributing Structures - Not to Scale

Cypress trees

buildings, sites, and structures are listed on the National Register of Historic Places. Twenty-nine structures were classified as noncontributing resources. The three areas of historic significance at Long Valley Farm include agriculture, architecture, and social history. The period of significance is 1914-1943. See Figure 3.1 for contributing and non-contributing structures. See Appendix B for an assessment of the structures at Long Valley Farm.

Located at the end of the western most farm road off Manchester Road, the Farm Seat complex includes the Rockefeller House, associated outbuildings, and the lawn area south of the McDiarmid Millpond. The outbuildings associated with the farm seat complex include the Garage, the Spring House, the Kennel, the Boathouse, the Woodshed and the Gazebo. Two of the most important existing buildings in the Farm Seat complex besides the Rockefeller House are the Mill House and Dam Gates and the Mill Pavilion. Both buildings

Agricultural Complex

North Field Tobacco Barn

are located on the southern edge of the millpond, northeast of the Rockefeller House. A boardwalk, constructed by the Rockefellers, meanders through the cypress grove across the millpond.

The Rockefeller House was built by James Stillman Rockefeller, soon after he acquired the property in 1937. Rockefeller moved Robert Wall Christian's house from its location south of the millpond and relocated it elsewhere on the property. The outbuildings were constructed between 1914 and 1985. The Mill Pavilion pre-dated Rockefeller and Christian, and was built between 1850 and 1860 and reworked in the 1920s. The dam and Pavilion Gates were built around the same time, but reworked in 1938. The Mill House and gates were constructed in 1938-1940, and ground corn meal until 1947 under the Long Valley name.

The main Agricultural Complex, consisting of approximately twenty buildings and structures, including the Farm Manager's Residence, the Pump House, the Granary, the Great Barn, the Silo, and several other structures. The complex is visible from Manchester Road and is located at the end of the eastern most road. This portion of the farm is the area of the original 1914 Christian farm complex. The buildings and structures in the complex were built between 1914 and 1980.

Other farm structures include tobacco barns, worker's houses, and other buildings. Several of these buildings are located near the Farm Seat and the Agricultural Complex. Others buildings are located throughout the property.

Mill House

Farm Seat, Rockefeller House

Utilities

Progress Energy is the local electric provider at Long Valley Farm. No residential water or sanitary sewer facilities currently exist on-site. A municipal waterline bisects the property at the county line, runs south along a utility easement and then runs southwest along an existing transmission line easement. This waterline was developed in order to accommodate growth in southern Harnett County as well as at Fort Bragg. A water tank was recently constructed by Harnett County north of the property as part of the utility master plan.

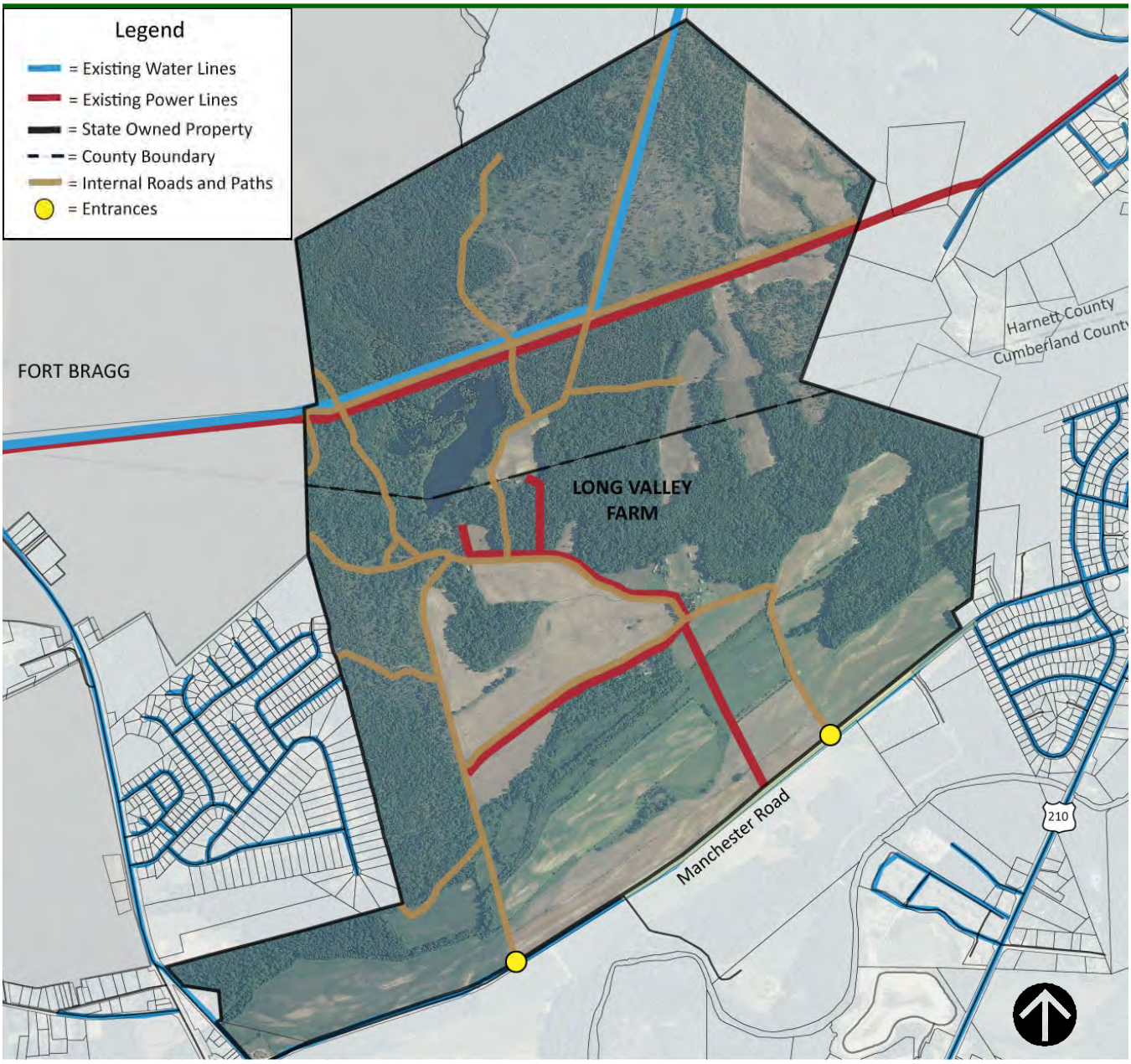


Figure 3.2 Long Valley Farm - Existing Roads and Utilities - Not to Scale

Harnett County water tank

An existing overhead electric line with a 100-foot wide easement extends at this location to the east. Harnett County is serviced by the Harnett County Department of Public Utilities, Central Electric Membership, South River Electric Membership Cooporation, and Piedmont Natural Gas Company. See Figure 3.2 for a map of the existing infrastructure and utilities around Long Valley Farm.

Water, electric and sewer connections are feasible at many points along the property lines at the locations of the existing residential subdivisions in Spring Lake. Septic may be an option as an alternative to sewer connections; further study will be needed to determine the suitability of soils at specific Long Valley Farm site locations.

Sandhills Section

The Sandhills Section is located approximately six miles north of the City of Fayetteville on the eastern edge of Fort Bragg, between Highway 401 at McCloskey Road (S.R. 1610) and Johnson Farm Road (S.R. 1606). The Sandhills Section is located at the approximate midpoint between Long Valley Farm to the west and the Cape Fear River to the east and it shares a 2.5-mile border with Fort Bragg. The Sandhills Section includes areas of restored longleaf pine habitat as well as wetlands and ponds.

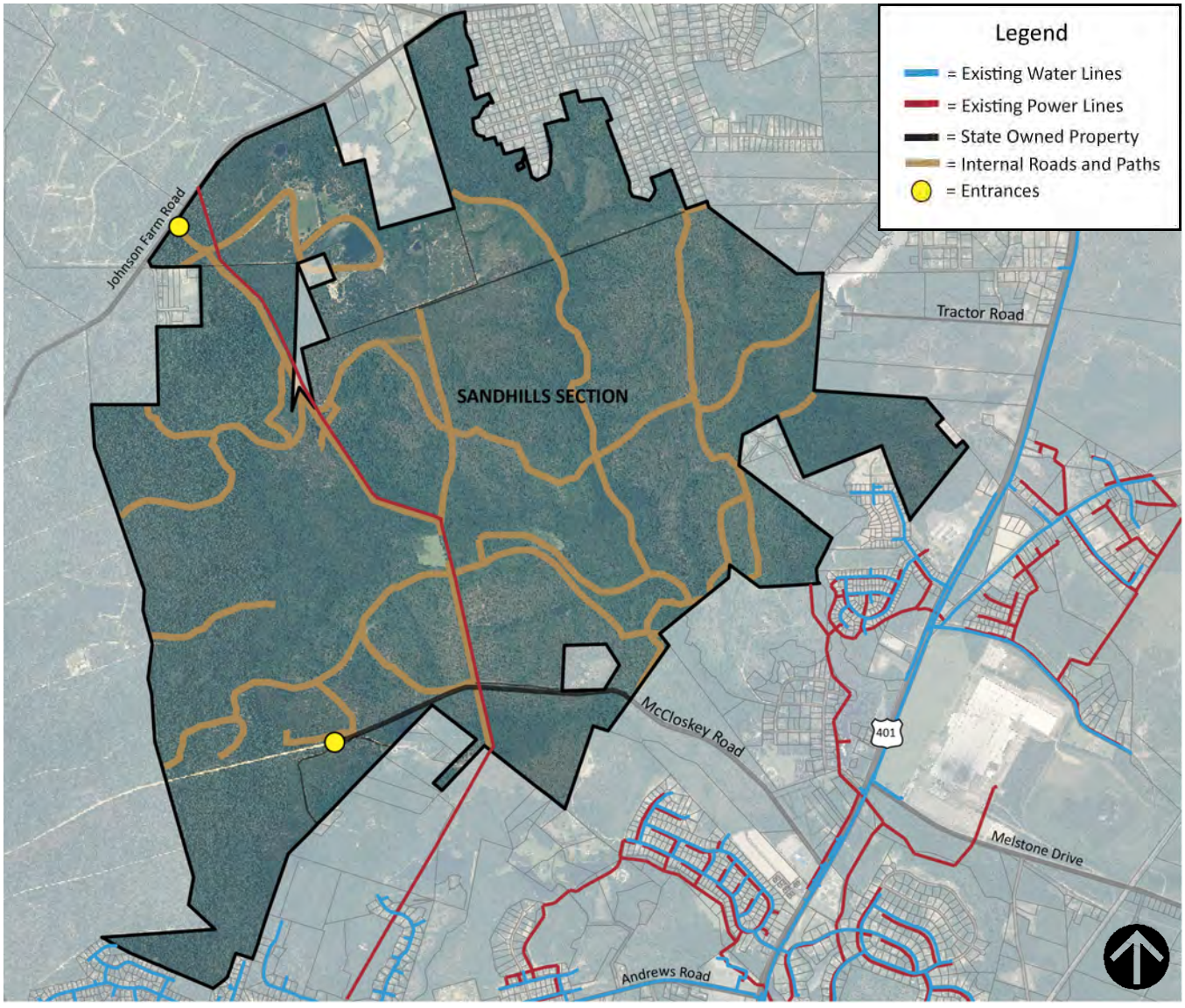


Figure 3.3 Sandhills Section - Existing Roads and Utilities - Not to Scale

Johnson Farm Road

Overhead powerline

Overhead powerline

Roads

The Sandhills Section has 1.6 miles of road frontage along McCloskey Road, and 1.05 miles along Johnson Farm Road. There are two vehicular entrances into the Sandhills Section, one on Johnson Farm Road and one on McCloskey Road. There are over eight miles of unpaved roads within the property. These roads are used mainly for forest access and management. The N.C. Department of Transportation has expressed interest in abandoning the 0.57-mile unpaved right-of-way for McCloskey Road.

Several subdivisions and residential parcels border the Sandhills Section and several roads dead-end into the property. Expo Street, Spurge Drive, Workman Street, Clear Branch Road and McFrench Drive within the Pine Valley subdivision terminate on the northern boundary of the Sandhills Section. Lake View Street and Eclipse Drive terminate on the eastern boundary, and Wake Forest Road and De Paul Drive terminate into the southwestern boundary of the Sandhills Section. These will not be considered for major park vehicular entrances but could be considered as potential pedestrian access points.

Buildings, Structures, and Facilities

The Sandhills Section has several existing structures including two houses, maintenance buildings, and a barn. A small house is located near the northern entrance along the main gravel drive. The rustic barn is located in the open meadow in the northern portion of the property along the main drive. The main house and shelter overlooks the pond. A maintenance building is located across the gravel road to the south.

Utilities

The Sandhills Section borders the city of Fayetteville to the south and Fort Bragg to the west. The Cumberland County Public Works Commission is the local electric, water and sanitary sewer utility provider for the city of Fayetteville. See Figure 3.3 for a map of the existing infrastructure and utilities around the Sandhills Section.

The Sandhills Section is bounded to the south and the east by residential subdivisions serviced by both water and sewer lines. Water, electric and sewer connections appear to be feasible at many points along the property lines at the locations of the existing residential subdivisions in addition to the area along Johnson Farm Road and McCloskey Road to US 401. Septic systems are also an option, but further study will be needed to determine the suitability of soils at specific sites.

Analysis of Existing Facilities and Infrastructure

The Carvers Creek State Park study area is within a rapidly growing region of the state and existing traffic circulation routes will continue to evolve and develop. Several highways and railroads bisect the study area, limiting connectivity.

Based on the existing facilities and infrastructure, several opportunities and constraints will influence the development that can occur in Carvers Creek State Park. The historic buildings and structures are significant at Long Valley Farm and would be a wonderful resource for education and interpretation.

Both Long Valley Farm and the Sandhills Section are in close proximity to existing utilities including electricity, sanitary sewer, and water. The potential and cost to connect to these utilities and potential natural resource impacts will influence the placement and development of recreational facilities.

4 NATURAL RESOURCES

Introduction

The Carvers Creek State Park study area contains rich natural resources unique to the Sandhills region. This area has been recognized by conservationists for containing one of the most distinctive and endangered ecosystems in North Carolina and the country. This ecosystem is home to numerous rare plants and animals rarely found outside of the Sandhills region. The Cape Fear River Section on the eastern edge of the study area has not been fully inventoried for this master plan, however the property is a wonderful natural resource.

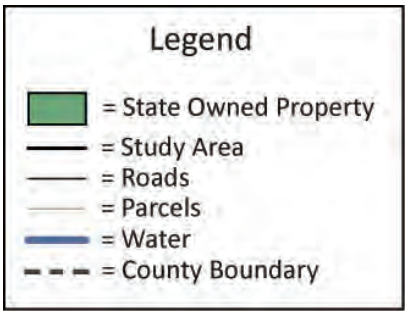
The Sandhills region is characterized by rolling topography and deep, sandy soils. Abundant creeks and dry sandy ridges have resulted in a large diversity of natural community types, with longleaf pine communities dominating the ridges and pocosin swamp and seepage communities found along the creeks. The study area contains diverse ecosystems: longleaf pine forests, mature mesic hardwood forests, blackwater streams, swamp forests, steep bluffs, and small waterfalls - a rare geomorphic feature for the region.

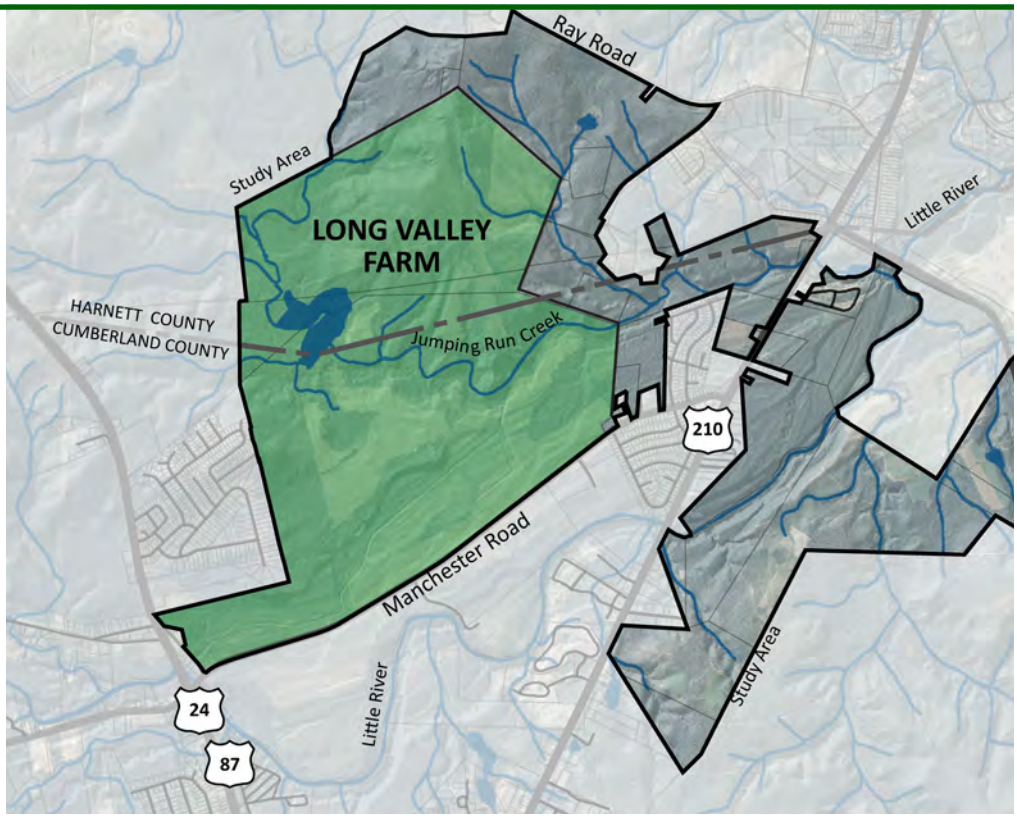
Geologists believe the advance and retreat of ancient oceans deposited sandy soils, and together with the clays deposited by erosion from the piedmont soils, the soils of the Sandhills region were formed. The present day rolling and sandy landscape was created by wind and water erosion.

The Cape Fear River flows along the southern edge of the Carvers Creek State Park study area. The area along the Cape Fear River contains two distinct regions: slopes and bluffs and the flat inner Coastal Plain. The slopes and bluffs region is located on the western side of the Cape Fear River. This area is characterized by entrenched creeks and banks reaching 100 feet high along the Cape Fear River and support communities which contain species more typically found in the mountains and piedmont. Waterfalls also occur in this area, especially along tributary creeks of the Cape Fear River.

The biodiversity of the Sandhills region depends on a combination of relatively high rainfall, sandy soils and an active cycle of wildfires. Longleaf pine forests are plant communities that adapted long ago to periodic burning, and their survival depends upon fire. The original forests were maintained by natural fires caused by lightning. As settlement and land development increased, the longleaf pine forests became increasingly fragmented. This fragmentation prohibited natural fires from running their course. Fire suppression by settlers in the area, continuing into the 20th century, also resulted in the decline of longleaf pine and biodiversity in this ecosystem. As a result, competing plant species thrived and inhibited the longleaf pine regeneration.

Controlled burns are fundamental to the ecological restoration and maintenance of longleaf pine ecosystems. Burning reduces the thickness of leaf litter, which allows for the establishment and germination of native species. Fire also returns beneficial nutrients to the soils, increasing soil fertility. Burning also controls invasive hardwood species.





Climate

The study area lies within the transition zone between the Coastal Plain and the Piedmont Plateau region of North Carolina. The subtropical climate of this region is known for high humidity and the absence of extreme winter temperatures. Average daily humidity varies from 85 percent at sunrise to 45 percent by early afternoon. The prevailing winds are southerly, except during periods of lower precipitation in October and November when winds shift to the north. Even during the driest months, the study area typically receives an average of more than 2.5 inches of precipitation per month (47.14 inches per year). Droughts typically occur in the region every three to five years. The average daily minimum temperature in January is 30 degrees Fahrenheit (F), while the average daily maximum temperature in July is 90 degrees F. The annual average maximum temperature is 73.4 degrees F and the annual average minimum temperature is 48.8 degrees F. Precipitation is decidedly greater during the summer and early fall. Thunderstorms are especially frequent in summer. Tropical storms and hurricanes that strike southeast coastal areas typically bring heavy rain. Winter storms can bring snow to the region with an average annual snowfall of 2.8 inches.

Aerial Map

Aerial data for Cumberland and Harnett counties was provided by The Nature Conservancy using Light Detection And Ranging (LIDAR) remote sensing data acquired in 2008. The aerial photography shows the study area, existing park parcels and how they relate to the current open space and development patterns occurring within the area. See Figure 4.1.

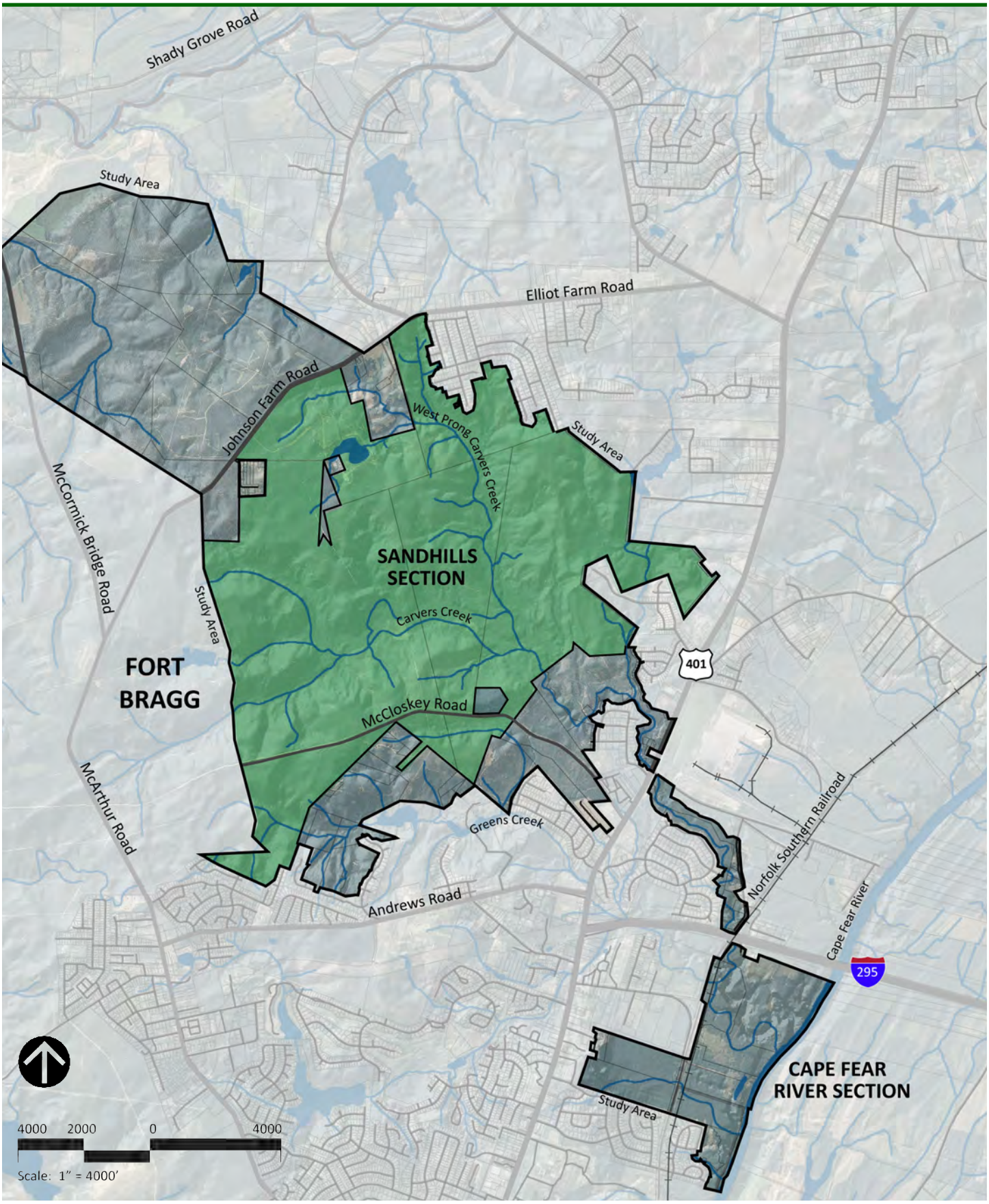
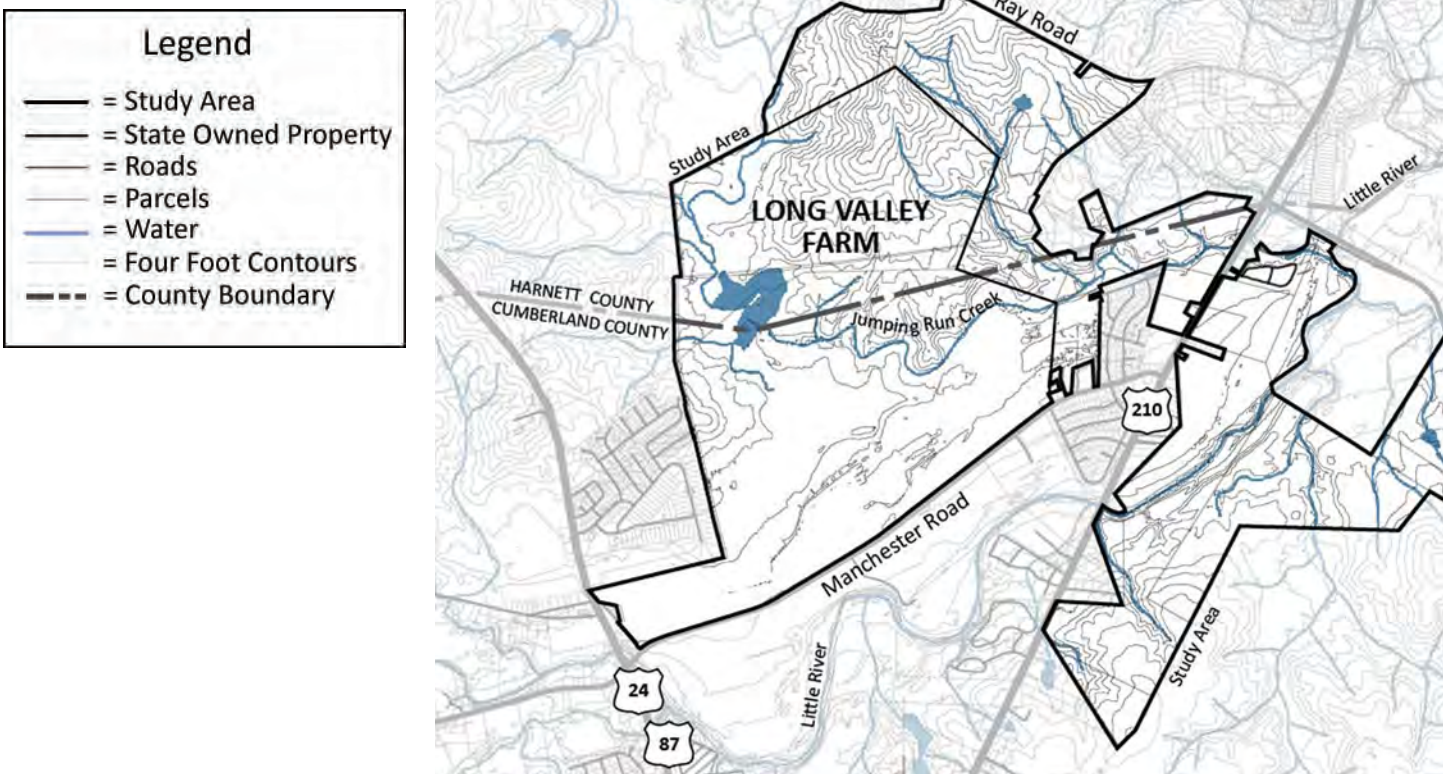


Figure 4.1 Aerial Map



Residential and commercial development within the study area can be seen primarily in the northern and southern portions, with the majority of the study area remaining as undeveloped woodlands and farm fields. Residential and commercial development in the northern area is adjacent to Long Valley Farm, in the Town of Spring Lake and in southern Harnett County. Development in the southern portion, adjacent to the Sandhills Section, is located to the northeast and south where it borders the municipal boundary of Fayetteville.

Topography

The study area includes more change in elevation than what is typically found in the Sandhills region of North Carolina, with a wide range of elevation change between the Long Valley Farm and the Cape Fear River Section. Long Valley Farm includes large areas of gentle slopes that have been used primarily for agricultural purposes. The Sandhills Section and Cape Fear River Section include steeper slopes. Figure 4.2 illustrates four-foot topographic contours for the study area. Contour data is based on 2007 LIDAR elevation data from the N.C. Department of Transportation.

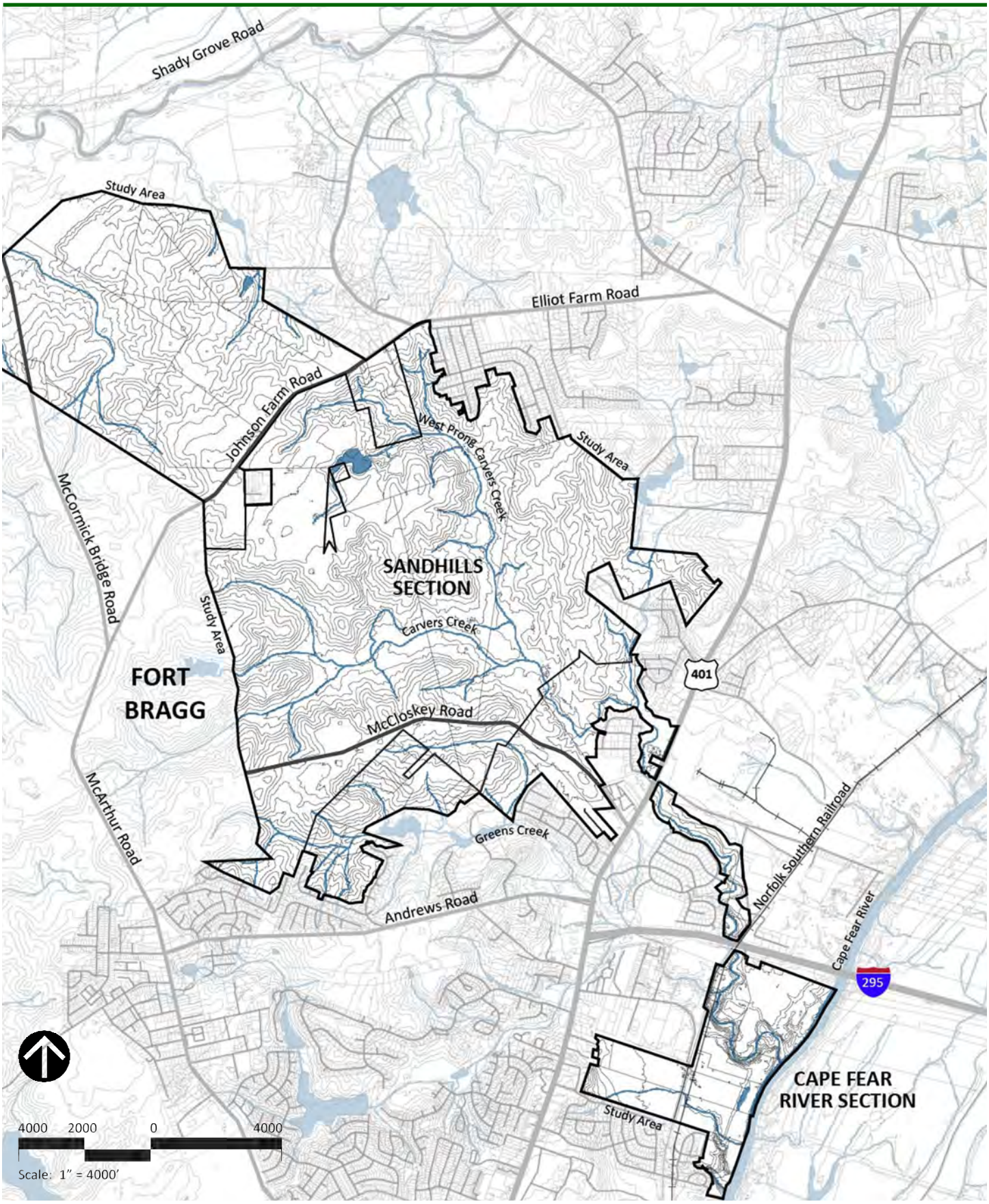
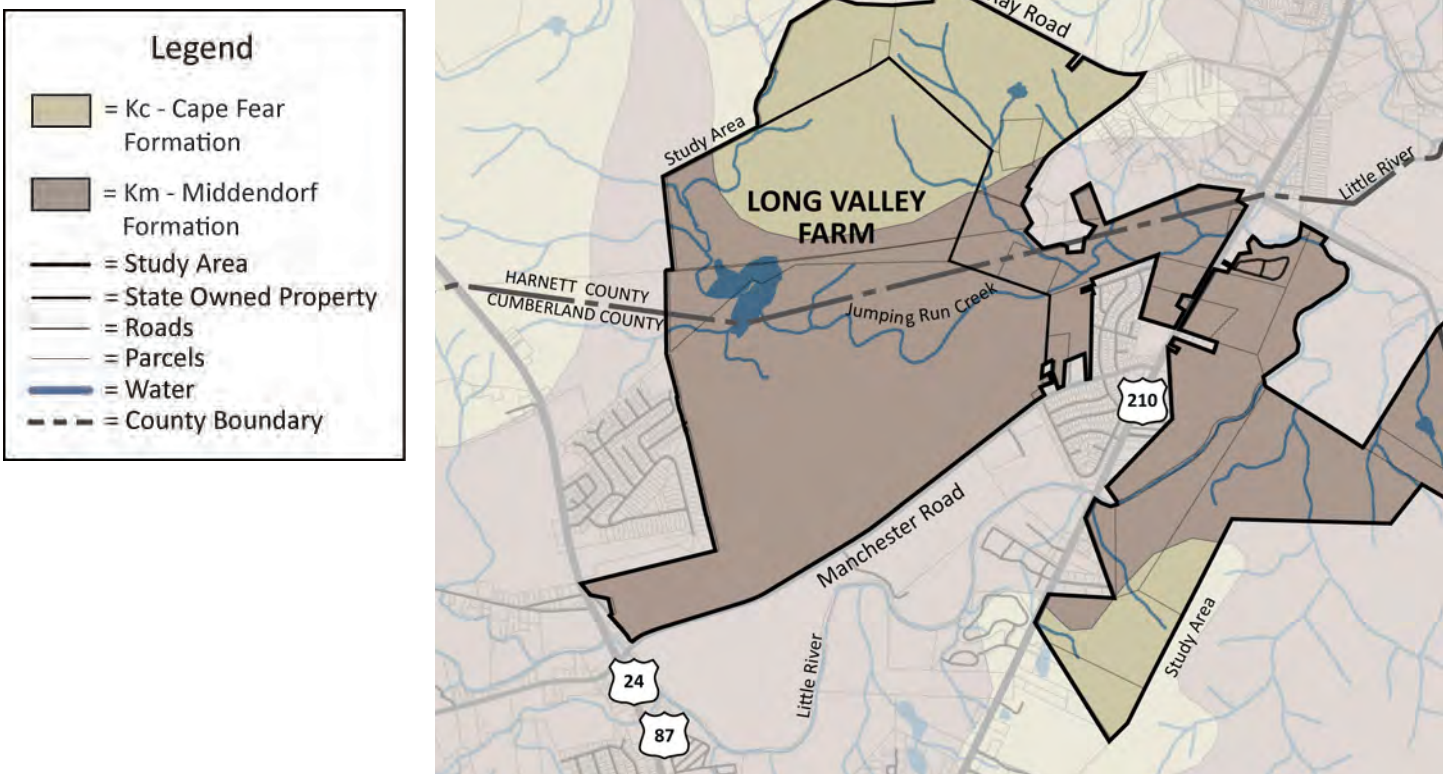


Figure 4.2 Topography Map



Geology

The Carvers Creek State Park study area consists of two major geologic formations; the Cape Fear Formation (Lower to Middle Cretaceous) and the Middendorf Formation (Upper Cretaceous). The Cape Fear Formation is characterized by sandstone and sandy mudstone which consists of interbedded clays and sands exposed along deeply entrenched rivers, such as the Cape Fear and Lower Little Rivers. Middendorf Formation includes fluvial-sands and clays commonly exposed on valley slopes and uplands in the Sandhills. Figure 4.3 illustrates the geology of the study area.

Bedrock in this area is composed of volcanic slate and is generally at depths of 200 to 400 feet below the surface. Overlying this bedrock are Cretaceous period sands and gravel attributed to the Lower Cape Fear and Upper Middendorf formations. Above the Cretaceous sands and gravels are Tertiary period sands on the eastern edge of the Sandhills. While sand is predominate throughout the Sandhills and rock outcrops are extremely rare, several sandstone outcrops occur on top of Middendorf beds, which are typically characterized by little soil development and sandstone occurring along narrow hilltops.

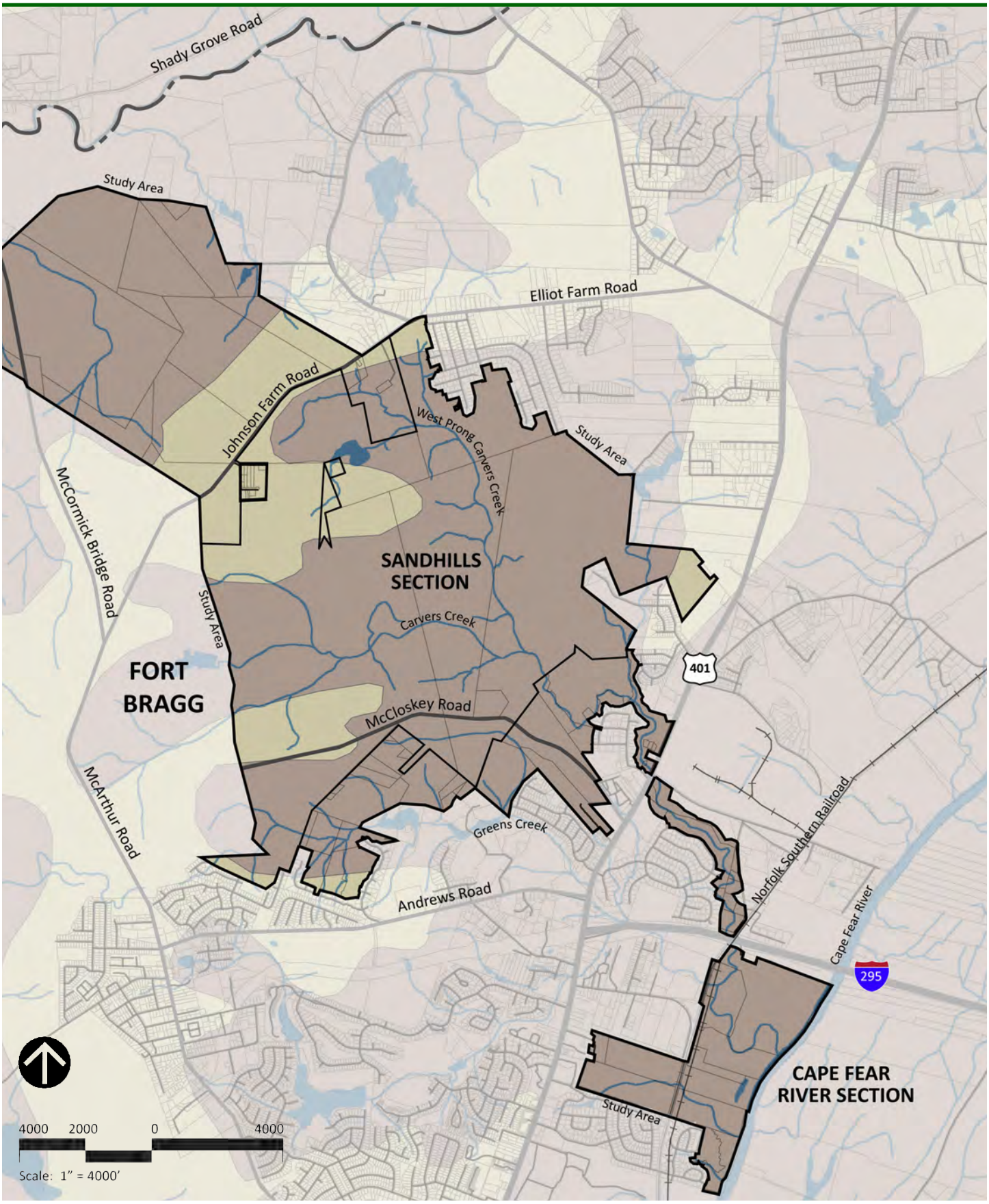
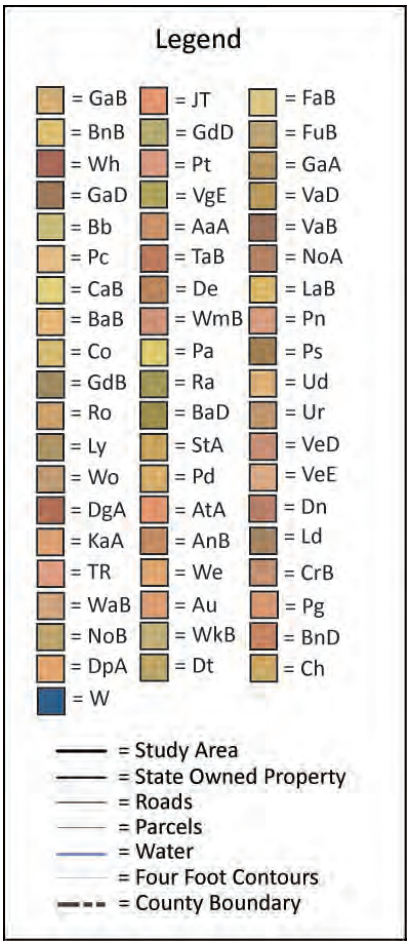
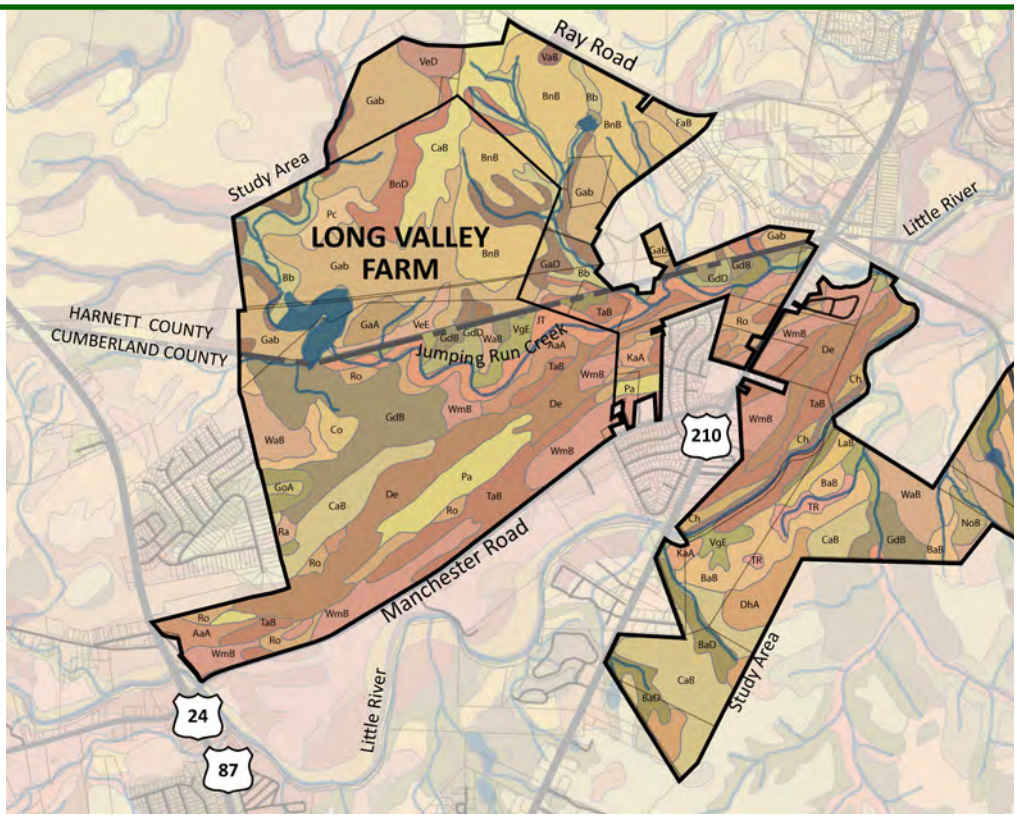


Figure 4.3 Geology Map





Soils

Carvers Creek State Park study area contains over 58 soil classifications. Soil type has a major influence on the suitability of development. The construction of roads, buildings, campsites, trails, and recreational facilities each require different levels of soil suitability.

The limiting characteristics of the soil types include erodibility, poor drainage, shallow water table depth, ponding, and flooding. Long Valley Farm contains some soils that are classified as potentially hydric and are unsuitable for development of structures, trails, camp areas, and picnic areas.

The Sandhills Section contains significant areas of hydric soils. These areas are located in the lower elevations and are associated with the existing waterbodies and floodplain. The location of these soils is significant for development in that they bisect the site from east to west, essentially dividing the Sandhills Section into two areas of potential development.

The limiting factors in the development of facilities and a recreational network in the Cape Fear River Section are due to the topography, slope, and potential high level of soil erodibility. Most of these erodible soils are located along the banks of Carvers Creek and its tributaries.

See Figure 4.4 for Soil Mapping of the study area. See Appendix C for more detailed soil descriptions. Soil data was provided by North Carolina Geographic Information Coordinating Council as well as the Natural Resource Conservation Service. More detailed soil investigations will be required during design and construction phases.

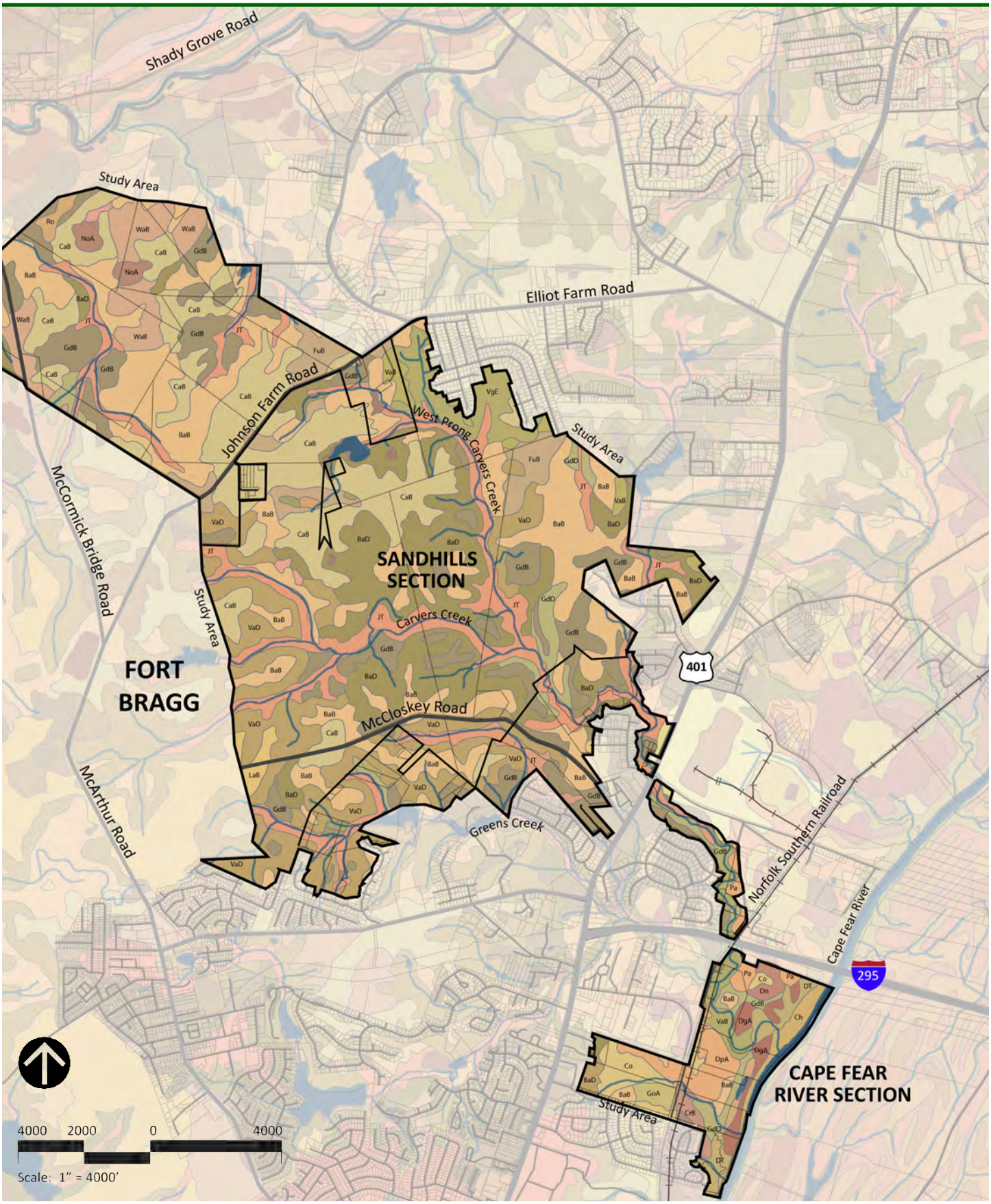
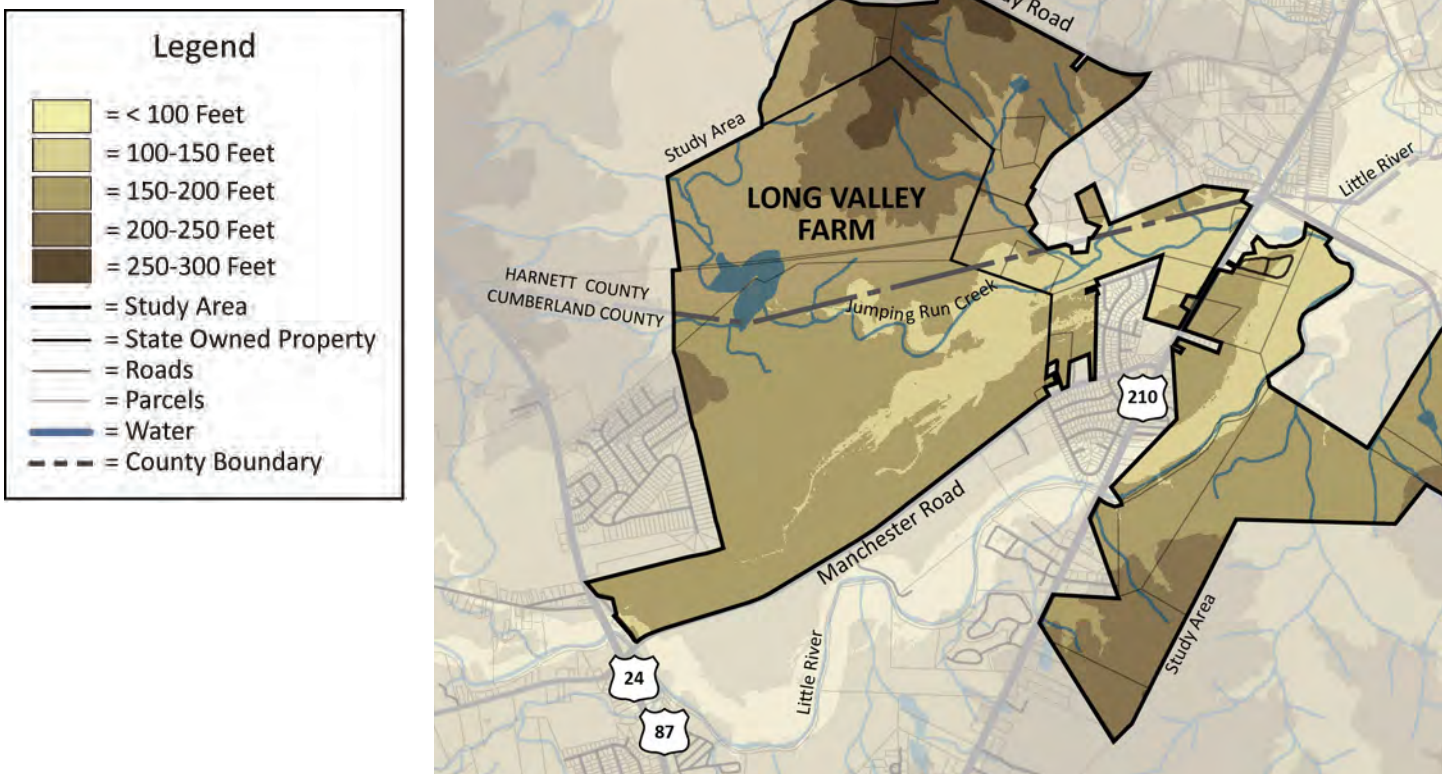


Figure 4.4 Soils Map



Elevation

Figure 4.5 illustrates the elevation levels within the Carvers Creek State Park study area. Elevation values range from a high point north of Long Valley Farm of approximately 280 feet above sea level, to a low point of 36 feet above sea level at the Cape Fear River. The elevations at Long Valley Farm range from 276 to 144 feet above sea level. The elevations at the Sandhills Section range from 256 to 124 feet above sea level. The elevations in the Cape Fear River Section range from 112 to 36 feet above sea level.

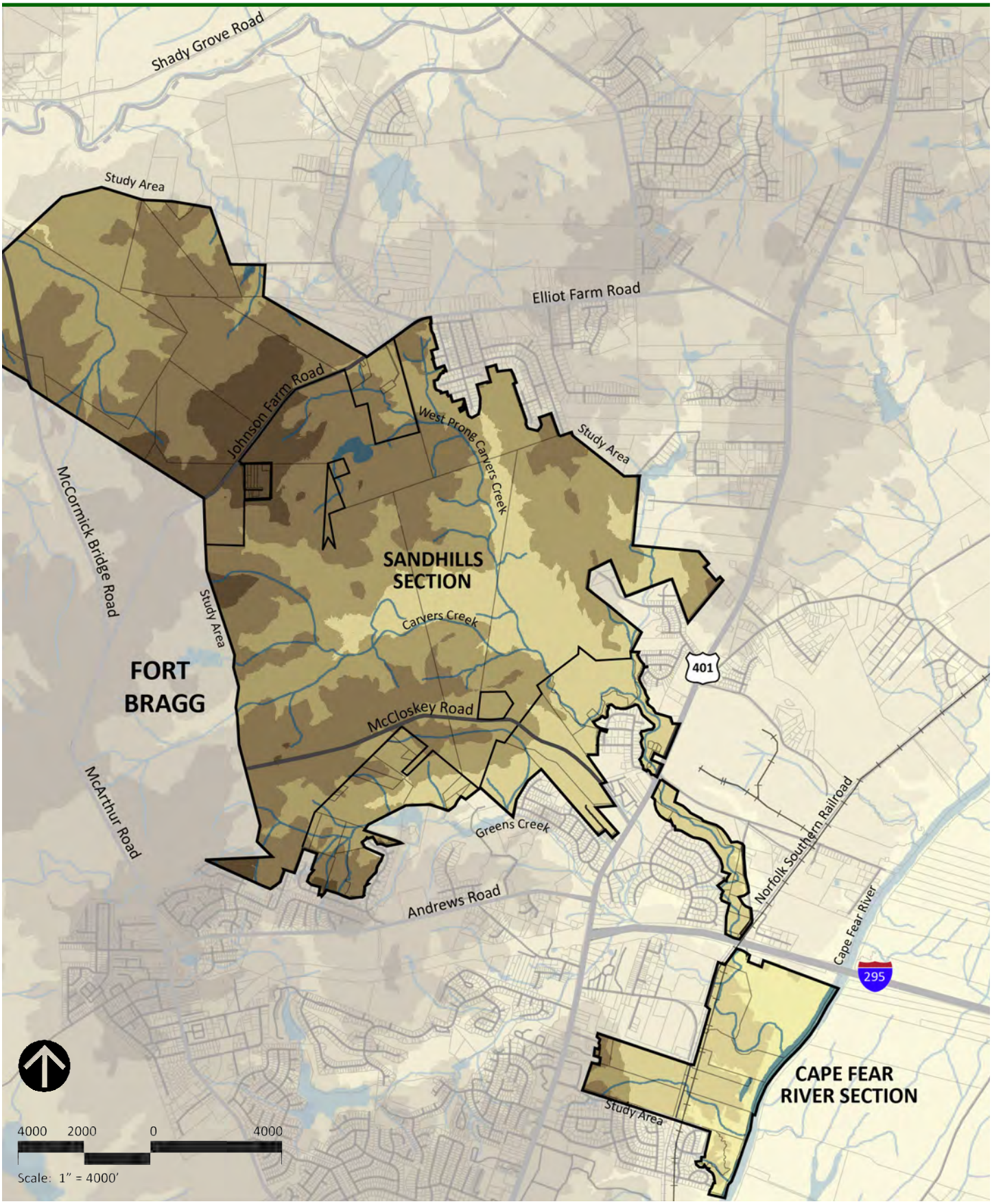
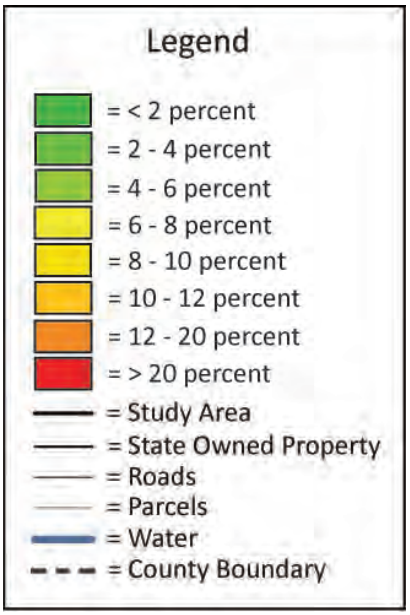
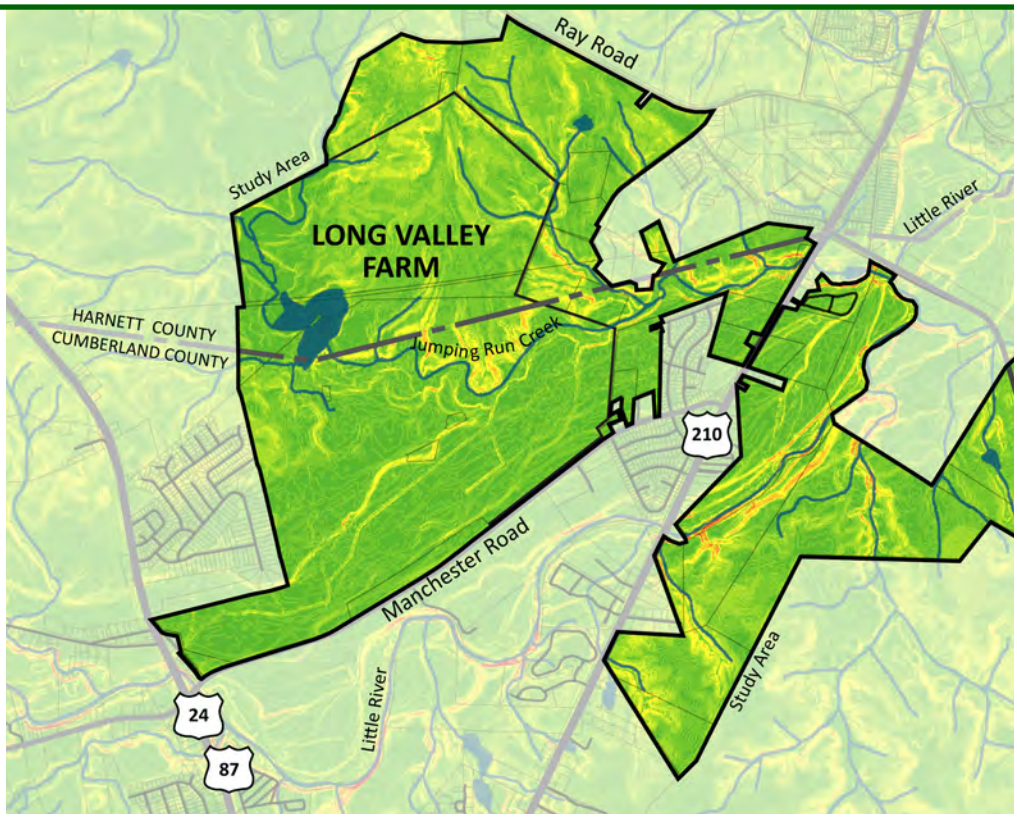


Figure 4.5 Elevation Map





Slope

The topography in the Carvers Creek State Park study area is varied from gently sloping agricultural land to rolling hills and steep bluffs. While most of the study area contains gentle slopes of less than 6 percent, there are areas, specifically along the Cape Fear River, where the slope exceeds 50 percent. Long Valley Farm, the Sandhills Section, and the Carvers Falls Section each exhibit different topography and visual character.

The majority of the land within Long Valley Farm is sloped at less than 4 percent. The majority of the land in the Sandhills Section is sloped less than 10 percent. Both the Sandhills and Cape Fear River Sections contain areas where slope exceeds 20 percent, specifically along creek banks.

Gentle slopes (between 0 to 6 percent) are shown on Figure 4.6, the slope analysis map, as varying shades of green. These slopes are typically found on former and current agricultural areas and are most suitable for development. Grading in these areas can occur without a high risk of erosion. Moderate slopes (6 to 10 percent) are represented on Figure 4.6 as shades of yellow. These slopes present somewhat limited development opportunities due to the potential erosion of sandy soils. Steep slopes (greater than 10 percent) are shown on Figure 4.6 as varying shades of red. These slopes are found primarily along creeks and drainage ways, and development in these areas should be very limited. The data for the slope analysis is based on LIDAR (Light Detection and Ranging) and does not represent survey quality data. Topographic surveys should be obtained during the site specific design of the properties.

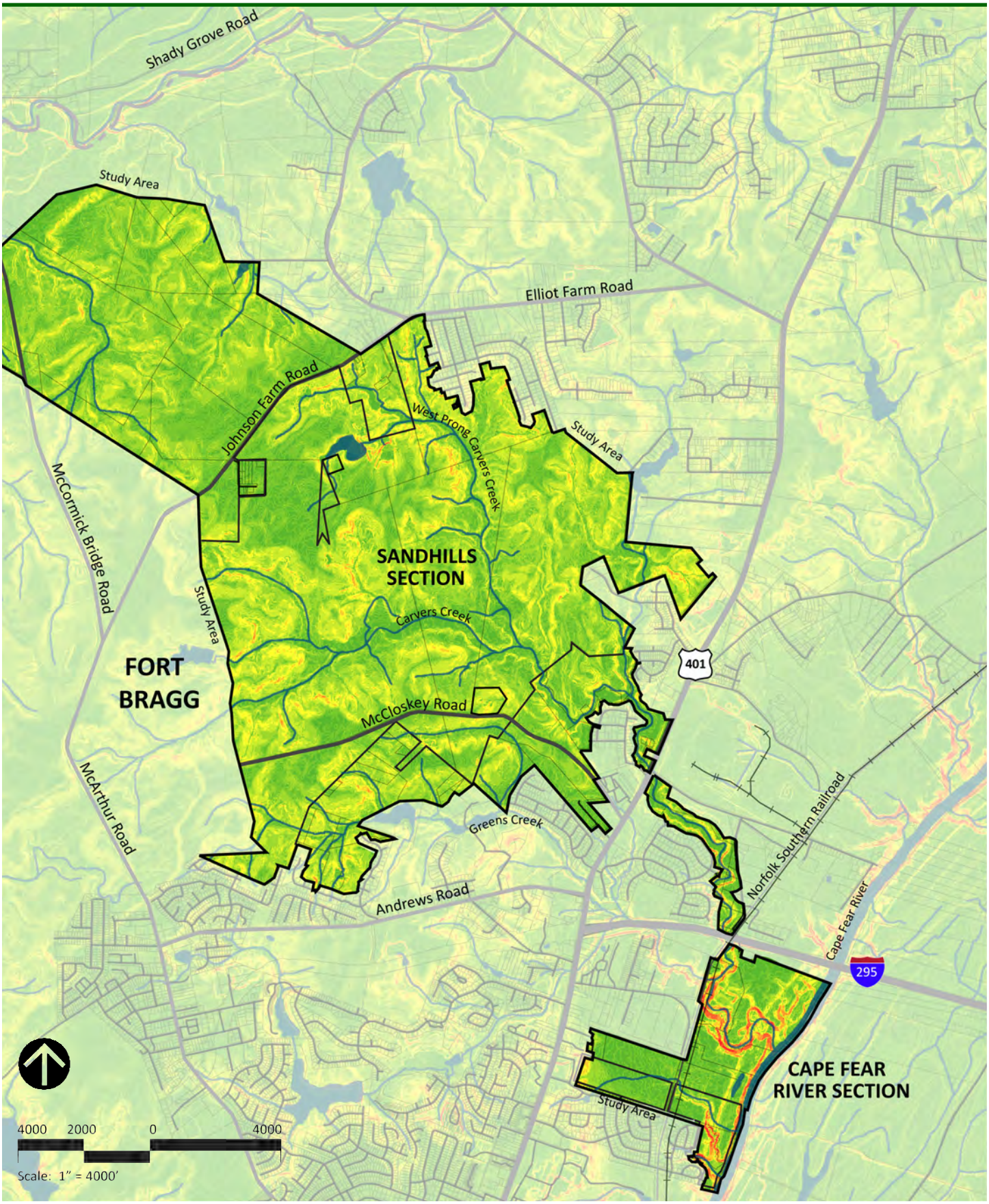
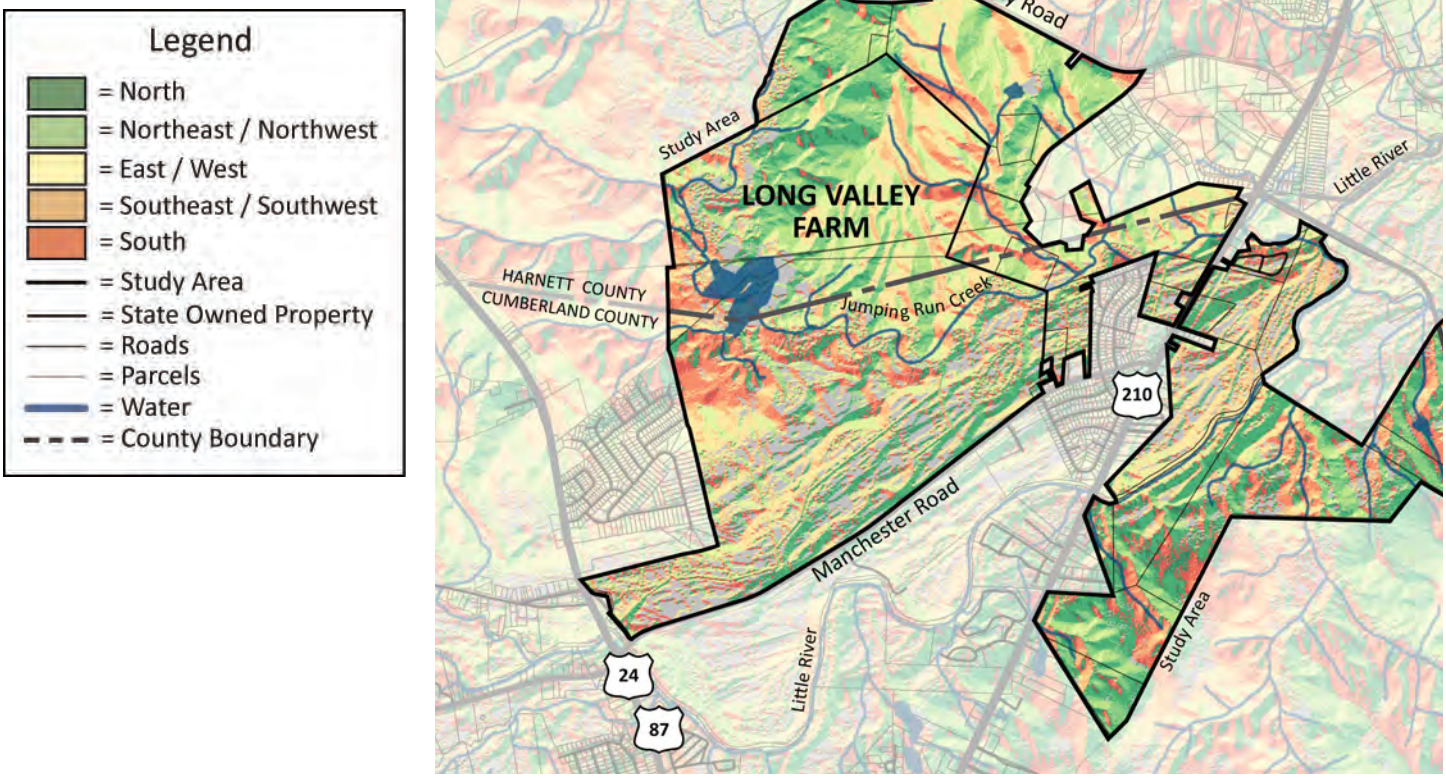


Figure 4.6 Slope Analysis Map



Aspect

The direction that land faces, or its aspect, has a large influence on ecological makeup, land management techniques, and potential for development. South and southwest facing slopes are generally drier, hotter, and have different biological communities than slopes that are facing north and northeast. This difference in microclimate also affects the land management techniques used. Prescribed burning plays a vital role in the health of the longleaf pine forest ecosystem. Prevailing winds, moisture levels, and vegetative communities influence the frequency and intensity of fire.

Aspect influences the type and site location of development. Designing public spaces and buildings in order to maximize year-round use and physical comfort is desirable. Development within the study area should include proper solar orientation of buildings for passive heating and cooling, natural daylighting, and ventilation. See Figure 4.7 for Aspect Analysis Map.

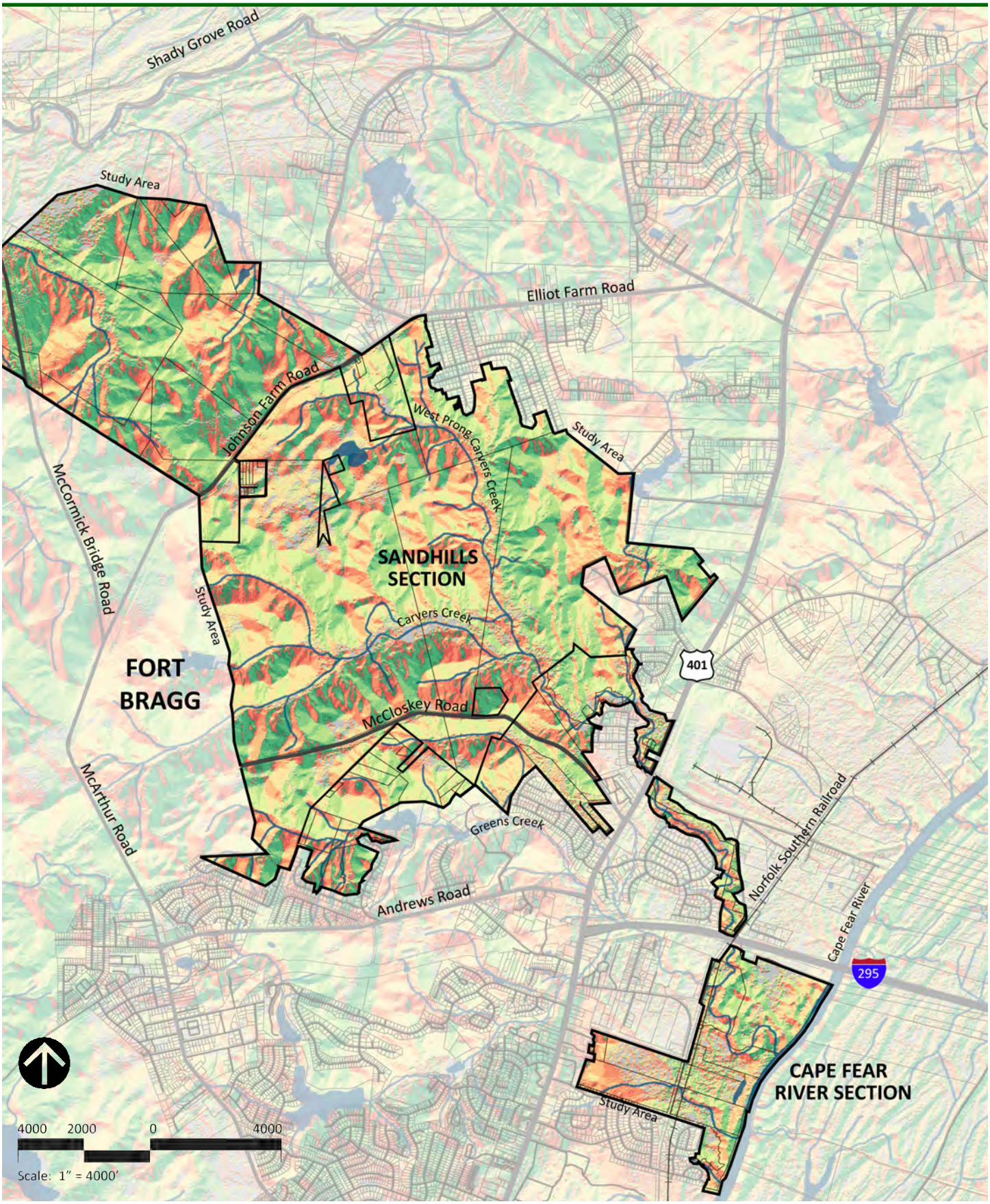
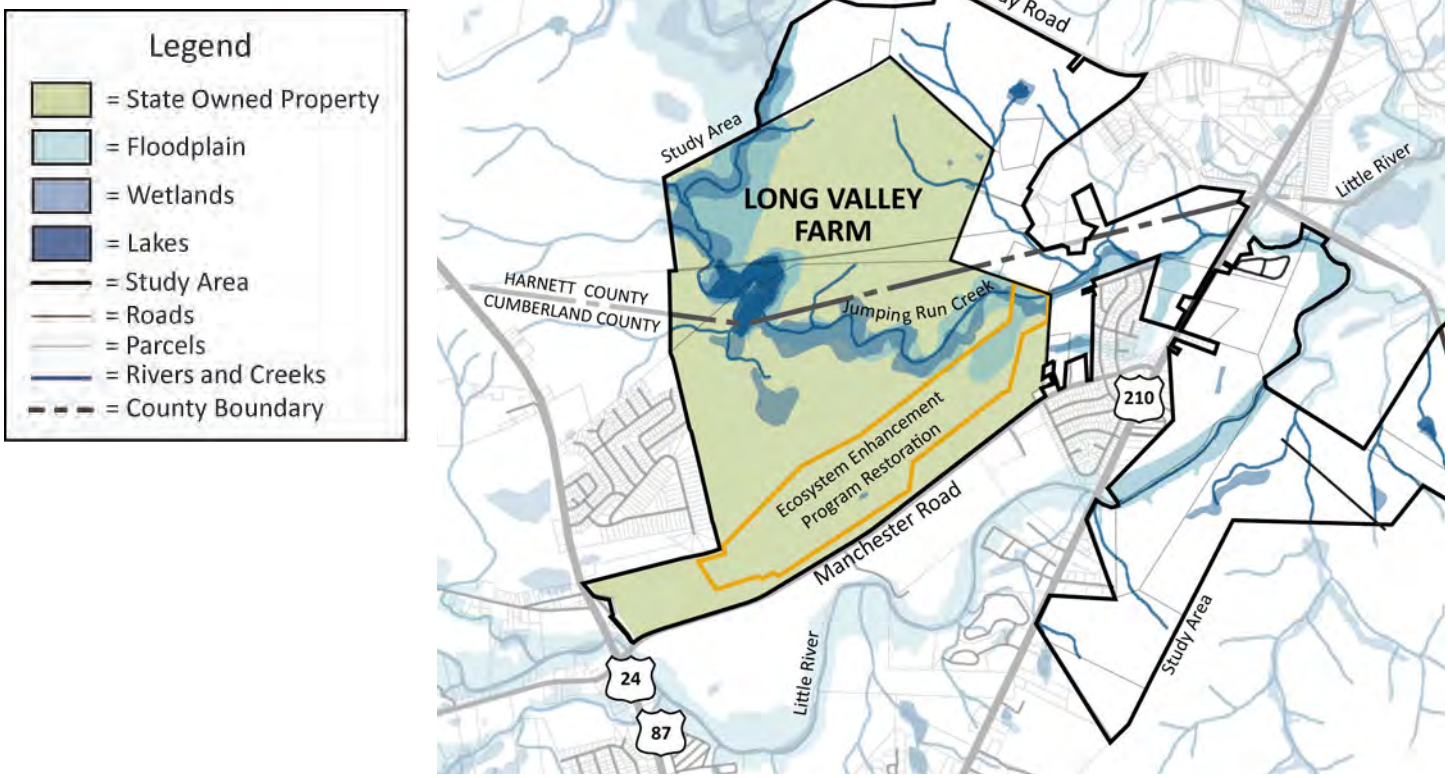


Figure 4.7 Aspect Analysis Map



Hydrology

The Carvers Creek State Park study area is located within the Cape Fear River Basin, see Figure 4.9. This watershed is the largest in the state, covering over 9,000 square miles. The study area is located within subbasin number 15. This subbasin measures 600 square miles and contains the city of Fayetteville as well as the majority of the Fort Bragg Military Reservation. The population of the Cape Fear River Basin is estimated to be 1,825,321 people, according to the 2000 census.

The Cape Fear River flows through the eastern portion of the subbasin, but most of the subbasin is made up of the Rock Creek and Little Rockfish Creek watersheds. The study area is located in the eastern central part of the subbasin. See Figure 4.8 for a map of the hydrology of the study area.

The Cape Fear River and its tributaries are an invaluable natural resource of North Carolina. It is the largest and most industrialized river basin in the state and has tributaries in 29 of the state's 100 counties. The Cape Fear River Basin extends from its headwaters north of Greensboro to the river's mouth in Southport and is about 200 miles in length. Twenty-seven percent of the state's population resides within the basin. The Cape Fear River provides freshwater for consumptive uses, routes for water transportation, various recreational opportunities, as well as critical wildlife and fisheries habitat.

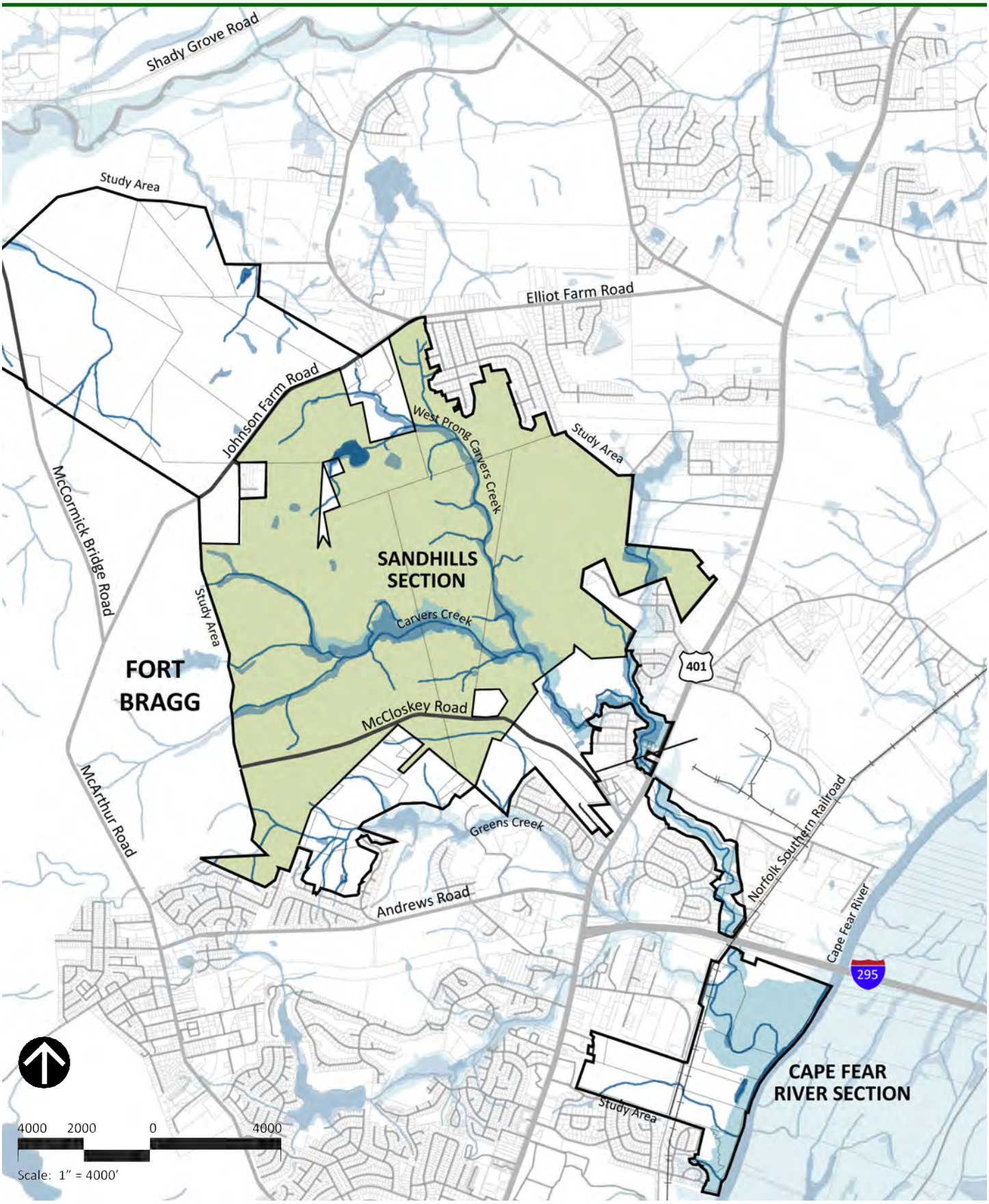


Figure 4.8 Hydrology Map

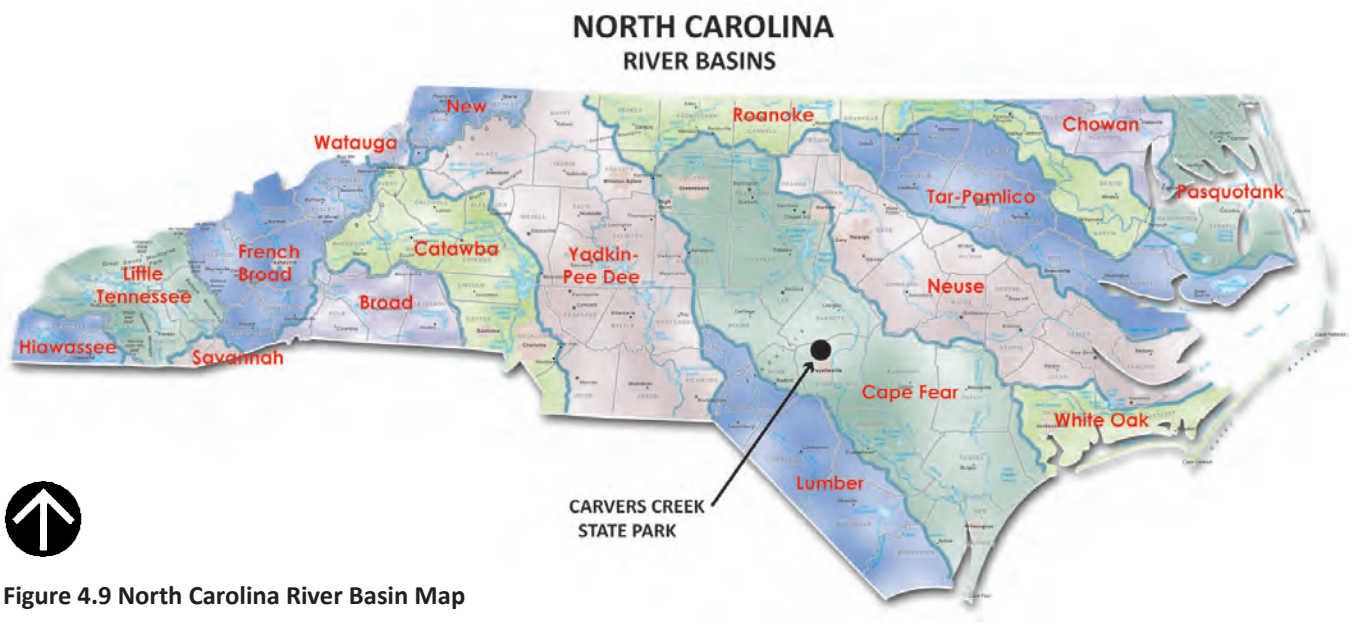


Figure 4.9 North Carolina River Basin Map

The creeks and rivers within the study area are classified as Class C and Water Supply-IV by the North Carolina Division of Water Quality. Class C includes waters that are protected for uses, such as secondary recreation, fishing, wildlife, fish consumption, aquatic life including propagation, survival and maintenance of biological integrity, and agriculture. Water Supply-IV are waters protected as sources of water supply for drinking, culinary, or food processing and are generally in moderately to highly developed watersheds or protected areas. One impaired waterbody lies within the study area: the Lower Little River, from the Fort Bragg lower water intake to the Cape Fear River.

The study area is bisected by several creeks, streams, and rivers of various sizes which eventually drain into the Cape Fear River. The Little River bisects the northern region of the study area. Water bodies within Long Valley Farm drain into the Little River. The Little River eventually meets with the Cape Fear River along the Harnett and Cumberland county line to the east of the study area.

Long Valley Farm

Creeks in the Long Valley Farm property drain primarily from northwest to southeast. One main creek, several smaller creeks, one impounded pond, and several small farming ponds are located on Long Valley Farm. Jumping Run Creek is a black water creek that flows through the property. It flows from Harnett County into McDiarmid Millpond in the northwestern portion of the property and exits along the eastern edge of the parcel in Cumberland County. Numerous unnamed creeks join Jumping Run Creek as it flows into the Little River.

The North Carolina Ecosystem Enhancement Program (EEP) completed a stream restoration of an unnamed tributary in the southern portion of Long Valley Farm in 2010. This project restored 7,057 linear feet and 96 acres of riparian and non-riparian wetlands and enhanced 1,935 linear feet of stream

and 3.4 acres of riparian wetlands, which is a Coastal Plain Small Stream Swamp system. Wetland restoration of the agricultural fields involved raising the local water table and restoring the natural flooding patterns. The existing stream channel was restored to a stable condition and wetland functions were restored on the adjacent hydric soils.

Sandhills Section

Four creeks are located within the Sandhills Section: Carvers Creek, West Prong of Carvers Creek, North Prong of Carvers Creek and Greens Creek. The flow of these creeks are primarily to the south/southeast. Numerous unnamed creeks are located within this property. The creeks flow to the southeast corner of the property where they are impounded by an earthen dam. The damming of these creeks results in large areas of backwater swamps. The confluence of Carvers Creek, North Prong, and West Prong Carvers Creek occurs outside of the Sandhills Section before they meet with the Cape Fear River.

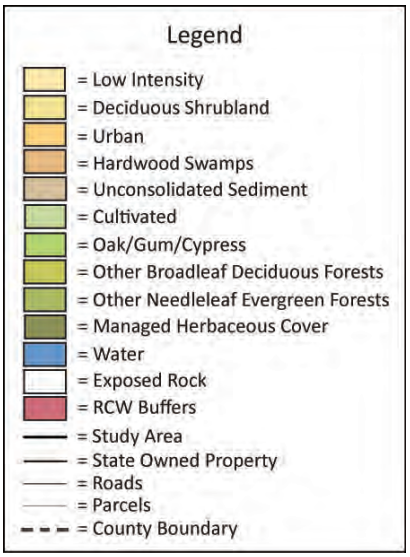
The study area includes a significant amount of land within the 100-year floodplain. The 100-year floodplain is defined as an area of land that has a 1 percent probability of experiencing a flood any given year. These areas are mapped on Flood Insurance Rate Maps by the Federal Emergency Management Agency. Floodplains are defined as low lands that adjoin surface water. The 100-year floodplain in Long Valley Farm surrounds Jumping Run Creek and McDiarmid Millpond. The 100-year floodplain in the Sandhills Section surrounds Carvers Creek, North Fork Carvers Creek and West Prong Carvers Creek. The 100-year floodplain in the Cape Fear River Section surrounds Carvers Creek and its tributaries.

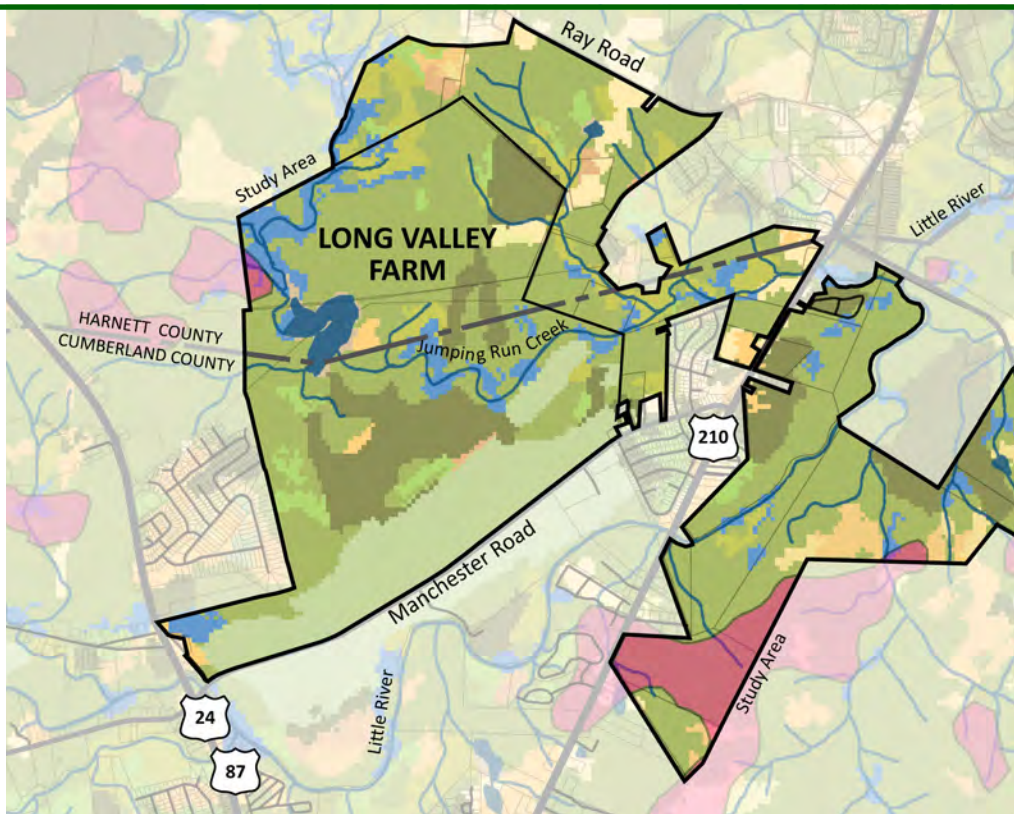
Carvers Falls Section

There are two main creeks in the Carvers Falls Section, Carvers Creek and McPherson Creek. The confluence of these two creeks occurs in the central portion near Carvers Falls. Carvers Creek then flows to the south and east to its confluence with the Cape Fear River.

Mapping of the wetlands is based on the National Wetlands Inventory. Wetlands provide many ecological, economic, and social benefits. They provide habitat for fish, wildlife and plants, hold and slowly release flood water, recharge groundwater, act as filters to clean runoff, recycle nutrients, and provide recreation and wildlife viewing opportunities. Numerous wetlands are located in the study area, mapped by the National Wetlands Inventory. There may also be wetlands present that are not mapped. Wetland delineation and survey for specific areas is recommended for the property at the time of site design.

Any surface water, including wetlands, found in the state park fall under the jurisdiction of the U.S. Army Corps of Engineers and the N.C. Division of Water Quality. Development within floodplain and wetlands will be avoided or will require permitting. Appropriate buffers will be determined to minimize impact, and wetlands and buffers will be avoided as much as possible.





Landcover - Flora and Fauna

The Sandhills region is among the most diverse botanical regions anywhere on the planet. There are several high quality natural communities throughout the study area as well as within Long Valley Farm, Sandhills Section, and the Cape Fear River Section. See figure 4.10 for a land cover map of the study area.

There are seven high quality natural communities within Long Valley Farm including Pine/Scrub Oak Sandhill, Xeric Sandhill Scrub, Sandhill Seep, Streamhead Pocosin, Coastal Plain Small Stream Swamp and Coastal Plain Semi Impoundment. The following birds are typically found in the longleaf pine forests here: Red-shouldered Hawk, American Kestrel, Red-cockaded Woodpecker, Red-headed and Red-bellied Woodpeckers, Brown-headed Nuthatch, Pine Warbler, and Chipping Sparrow. Eastern box turtle, northern spring peeper, eastern tiger swallowtail, northern black racer, and eastern fox squirrel can also be found here.

In addition to agricultural and pasture land, there are some specific plants and trees that are worth noting. Native species such as yellow pitcherplant, pinebarren sandreed, and Loomis's loosestrife are located on the property. At the Rockefeller House, there are several magnolias, camellias, azaleas, dogwoods, and hollies of possible historic significance. The old pear tree and wisteria are rumored to have been planted by Robert Wall Christian. There are two live oaks that were brought to the property by Mrs. Rockefeller from her family home in Cumberland County, Georgia.